



88045766



U.S. Department of the Interior  
Bureau of Land Management

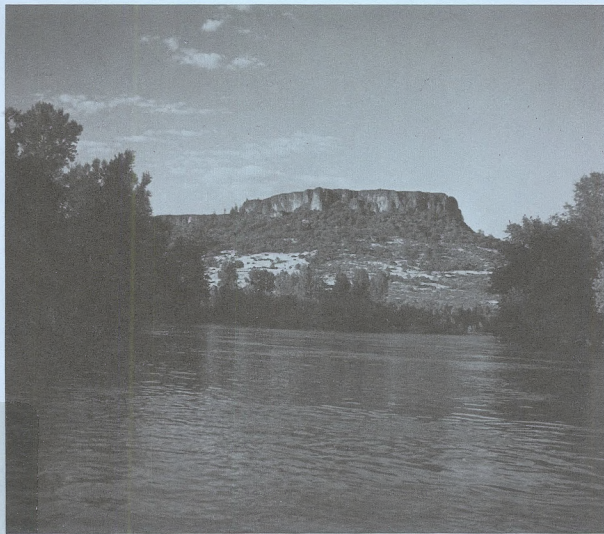
Medford District Office  
3040 Biddle Road  
Medford, Oregon 97504

October 1994



# **Medford District Proposed Resource Management Plan/ Environmental Impact Statement**

## **Volume II**



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

BLM LIBRARY  
RS 150A BLDG. 50  
DENVER FEDERAL CENTER  
P.O. BOX 25047  
DENVER, CO 80225

BLM/OR/WA/ES-94/35+1792

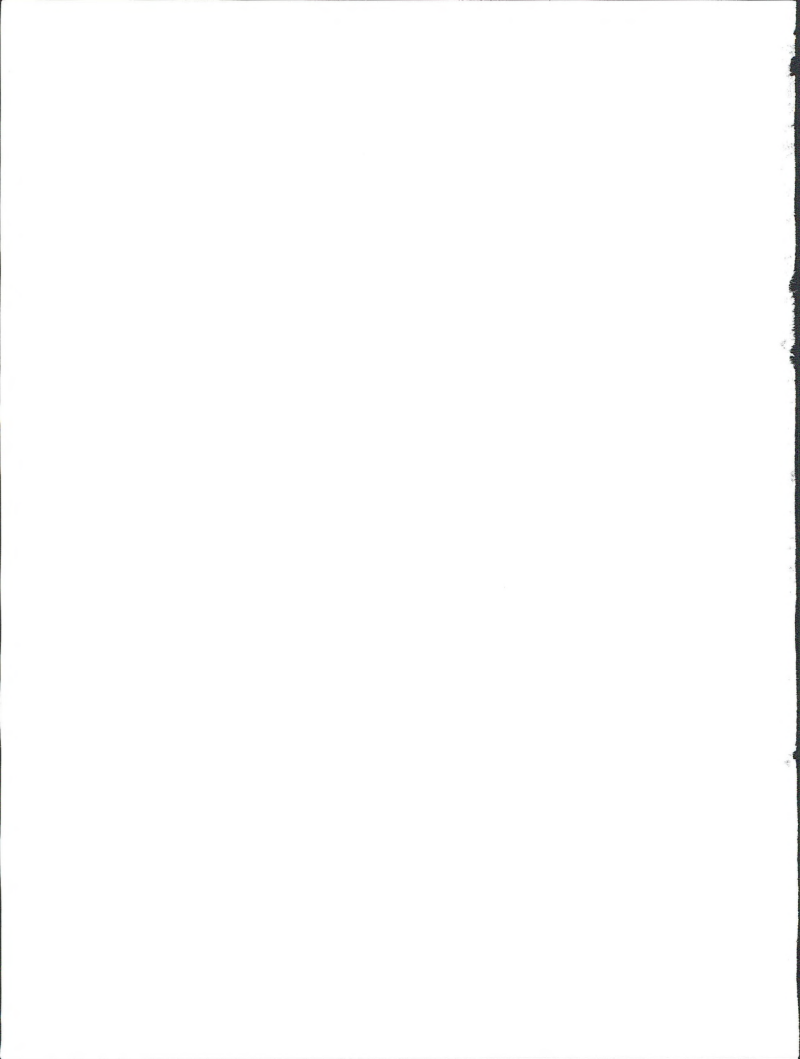


## LIST OF APPENDICES

## Introduction

A.	Summary of Scoping .....	3
B.	Legal Guidelines .....	5
C.	Key Sections of the Pacific Yew EIS .....	7
D.	State Director's Guidance .....	11
E.	Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl. ....	29
F.	Best Management Practices .....	30
G.	Special Status Species, Species to be Protected Through Survey and Manage Guidelines, and Protection Buffer Species .....	57
H.	Potential Management of Candidate ACECs Dropped From ACEC Consideration .....	77
I.	Management of Candidate ACECs Not Selected in the Proposed RMP .....	79
J.	Wild and Scenic River Suitability Assessments .....	81
K.	Silvicultural Systems Utilized in the Design of the Proposed RMP .....	99
L.	Medford District Forest Genetics Program .....	117
M.	Proposed Restrictions on Mineral and Energy Exploration and Development Activity .....	121
N.	Locatable Mineral Surface Management, 43 CFR 3809 Standards for Exploration, Mining, and Reclamation .....	133
O.	Guidelines for Development of Saleable Mineral Resources .....	139
P.	Land Ownership Adjustment Criteria .....	143
Q.	Land Tenure Adjustment Zone 3 Lands .....	145
R.	Monitoring and Evaluation of the Approved RMP .....	147
S.	Insect and Disease Occurrence Within the Medford District .....	165
T.	Timber Supply Analysis for BLM Planning .....	167
U.	Cumulative Effects Analyses for Small Watersheds of Concern .....	173
V.	Comments and Responses .....	See Volume III
W.	Comment letters .....	See Volume III
X.	Reasonable Foreseeable Mineral Development .....	181
Y.	Consistency .....	187
Z.	Effects of Silvicultural Systems on Tree-Form Species Composition .....	195
AA.	Effects of Change in the Potential Suitable Commercial Forestland Base on Reforestation Potential .....	197
BB.	Effects of Silvicultural Practices and Silvicultural Systems on Wood Quality, Timber Yields and Economic Value .....	203
CC.	Condition of Stream Habitat on All Planning Area Lands In the Short Term and Long Term Under All Alternatives, Except the NA .....	209
DD.	Present Condition of Potential Special Areas .....	211

BLM LIBRARY  
FIS 150A BLDG. 50  
DENVER FEDERAL CENTER  
P.O. BOX 25047  
DENVER, CO 80225



## Appendix A. Summary of Scoping

Scoping of the Medford District Resource Management Plan/Environmental Impact Statement (RMP/EIS) began in September 1986 when a mailer was sent to a mailing list of some 2,093 parties, inviting them to identify issues and concerns for BLM to consider in the planning process. Ten open houses were held by BLM's Medford District during the comment period to help interested parties focus on the question. The purpose of scoping was to identify those issues and concerns to be analyzed in the planning process.

With the comments received, the district's planning team and managers distilled a list of issues and concerns. BLM distinguished an issue as a matter of controversy or dispute over resource management activities or land use that is well defined or topically discrete and can be addressed in the formulation of planning alternatives. In practice, issues are resolved by resource allocations or restrictions. Concerns, on the other hand, are generally not so well defined, or do not directly involve controversy or disputes over resource management activities or land use allocations, and do not lend themselves to formulating land use alternatives. Concerns are usually addressed by analysis and documentation in the RMP/EIS. Some identified issues and concerns are not addressed in this RMP/EIS, as they are beyond the control of the State Director, are unrelated administrative problems, or are not within the legal jurisdiction of BLM.

The issues and concerns addressed in this RMP/EIS are described in Chapter 1. This list of issues and concerns was sent to interested parties March 1987.

Further scoping related to refinement of the issues and determination of a reasonable range of alternatives to address in the RMP/EIS. The latter facet of scoping was handled through the development of State Director Guidance (SDG) for formulation of alternatives (see Appendix 1-F). This guidance also directed a number of sensitivity analysis to address relevant management options that could not be effectively addressed in a manageable array of fully analyzed alternatives. Chapter 5 summarizes other public involvement activities associated with development of this Draft RMP/EIS.

In public comments and internal discussions, there were a number of alternatives or potential elements of alternatives considered but eliminated from detailed analysis. These are summarized in the following discussions.

- Alternatives that would meet specified timber production target levels (e.g., one identified in a regional supply analysis or one that would maintain the level in existing plans). Such alternatives could be explicitly designed only with an optimization model. Early in the planning process, BLM chose not to invest the many millions of dollars that would have been necessary to adopt and use an optimization model in its western Oregon planning effort.
- Alternatives that explicitly reflect the policies and programs of the O&C counties and of the State. Until opportunities and tradeoffs are fully analyzed, such alternatives could not be formulated. At that point in the process, it was BLM's intent to develop a Preferred Alternative (PA) consistent with those policies and programs to the extent they are consistent with each other and also consistent with Federal laws and regulations.
- An alternative based on the assumption that FLPMA, rather than the O&C Act, was the predominant statutory mandate for management of the O&C and CBWR lands. None of the initial set of alternatives was based on a specific real or assumed statutory mandate. BLM believes that management under FLPMA falls within the range established by the initial set of alternatives.
- A "no planned timber harvest" alternative. BLM considers such an alternative for all BLM-administered lands in western Oregon outside the reasonable range of alternatives. The counterpart of a no planned timber harvest alternative would be an alternative that would remove all merchantable timber over the life of the plan. Such a radical departure from sustained yield principles on either end is clearly outside the reasonable range of alternatives and is inconsistent with both FLPMA and the O&C Act.
- Alternatives considering neither growth enhancing management practices nor the allowable cut effect in setting an allowable sale quantity (ASQ). The impact of foregoing these can be identified from the sensitivity analyses of the PA.
- An alternative which would forego slash burning; one that would forego use of herbicides. These activities and the options of foregoing them were addressed in BLM's EIS, Western Oregon Program-Management of Competing Vegetation, 1989. This RMP/EIS is tied to that EIS.



- An alternative that uses uneven-aged management as the predominant silvicultural system. In many locations that prescription would fail to meet reforestation standards, a violation of the sustained yield mandate. Uneven-aged management is considered for use in stands where it would be economically and environmentally feasible and reforestation standards could be met.
- An alternative which excludes Site IV lands from timber harvest. Such an alternative would not address any important environmental or resource management objectives better than options already being addressed.
- An alternative that maximizes timber production subject to the constraint of economic feasibility. Analysis of the economic feasibility of Alternative A showed that such a constraint would negligibly affect the ASQ of that alternative.
- Alternatives which vary the size of spotted owl habitat protected for each nest site. In light of the Interagency Scientific Committee report and subsequent proposals by the Fish and Wildlife Service, BLM concluded that such variation had little relevance.
- An alternative that would protect 110 spotted owl areas, as provided for in the 1987 revised BLM-

ODFW agreement, was originally proposed by BLM. After the Interagency Scientific Committee report was released in 1990, this alternative no longer seemed relevant.

- An alternative that manages as Visual Resource Management (VRM) Class II all lands inventoried as VRM Classes III and IV. Such an alternative would only be logical if matched with the other goals of an alternative with a very constrained timber harvest base. This management option, intended to optimize protection of scenic values even on areas identified in inventories as low in scenic value, was felt to be too arbitrary to warrant its application as an additional constraint to alternatives that severely restrict timber production to emphasize more meaningful objectives.
- An alternative that protects a minimum of one-quarter-mile-wide riparian management areas (RMAs) along third order and higher streams, Class I streams and other waters; and maintains and enhances water quality at the highest level of water quality required for municipal use. Such an alternative would exclude almost all commercial forestland from timber management. Such extensive RMAs would be far in excess of what is needed to protect water quality and riparian values. Thus, it was considered outside the range of reasonable alternatives.

# Appendix B

## Legal Guidelines

The following statutes and executive orders (as amended) constitute the major legal guidance for planning and management of lands administered by BLM in western Oregon. This list is not necessarily all inclusive but does represent the primary legal guidance to be considered in preparation of the Resource Management Plan.

Federal Land Policy and Management Act of 1976 (FLPMA)	43 USC 1701
The O&C Sustained Yield Act of 1937	43 USC 1181a
National Environmental Policy Act of 1969 (NEPA)	42 USC 4321
Environmental Quality Improvement Act of 1970	42 USC 4371
Executive Order 11514, Protection and Enhancement of Environmental Quality (1970)	
Taylor Grazing Act	43 USC 315
Recreation and Public Purposes Act	43 USC 869
Unlawful Inclosures or Occupancy Act	43 USC 1061
Mining and Minerals Policy Act of 1970	30 USC 21a
Mining Act of 1872	30 USC 26
Mineral Leasing Act of 1920 (Mineral Lands Leasing Act)	30 USC 181
Materials Act of 1947	30 USC 601
Geothermal Steam Act of 1970	30 USC 1001
Geothermal Energy Act of 1980	30 USC 1501
Antiquities Act of 1906	16 USC 431
Historic Sites, Buildings, and Antiquities Act	16 USC 461
National Historic Preservation Act	16 USC 470
Archaeological Resources Protection Act of 1979	16 USC 470aa
Reservoir Salvage Act of 1960	16 USC 580m-n
Fish and Wildlife Coordination Act	16 USC 661
Bald Eagle Protection Act	16 USC 668
Sikes Act	16 USC 670a
Migratory Bird Treaty Act	16 USC 703
Migratory Bird Conservation Act	16 USC 715
Wilderness Act	16 USC 1131
National Trail Systems Act	16 USC 1241
Wild and Scenic Rivers Act	16 USC 1271
Executive Order 11644, Use of Off-Road Vehicles on the Public Lands (1972)	
Executive Order 11989, Off-Road Vehicles on Public Lands (1977)	
Wild Free-Roaming Horses and Burros Act	16 USC 1331
Coastal Zone Management Act of 1972	16 USC 1451
Endangered Species Act of 1973	16 USC 1531
Soil and Water Resources Conservation Act of 1977	16 USC 2001
Executive Order 11988, Floodplain Management (1977)	
Executive Order 11990, Protection of Wetlands (1977)	
Coastal Barriers Resources Act	16 USC 3501
Land and Water Conservation Fund Act of 1965	16 USC 4601-4
Federal Water Pollution Control Act/Clean Water Act	33 USC 1251
Safe Drinking Water Act	42 USC 300 (f)
American Indian Religious Freedom Act	42 USC 1996
Resource Conservation and Recovery Act of 1976	42 USC 6901
Clean Air Act	42 USC 7401
Comprehensive Environmental Response, Compensation and Liability Act of 1980	42 USC 9601
Emergency Planning and Community Right-to-Know Act of 1986	42 USC 11001





# Appendix C

## Key Sections of the 1993 Record of Decision on Pacific Yew Environmental Impact Statement

The following is excerpted verbatim from the Record of Decision, Pacific Yew of September, 1993. The remainder of the Record of Decision is incorporated by reference.

### The Decision

It is our decision to select Alternative B as the Pacific yew harvest strategy for the National Forest System lands and lands administered by the Bureau of Land Management in Washington, Oregon, California, Idaho, and Montana for the next five years (1993-1997). Our selection of Alternative B is based on the analysis in the FEIS, consideration of public comments on the DEIS, and a significant reduction in demand for yew from federal lands for taxol production.

Alternative B permits harvest of any part of the Pacific yew for taxol production from timber sale units and where it might otherwise be destroyed. For the purpose of this document, timber sale units are defined as any area within a timber sale which has a silvicultural prescription for a clearcut<sup>2</sup>, shelterwood<sup>2</sup>, or seed tree<sup>2</sup> harvest method. Pacific yew may also be harvested for taxol from other areas where the yew would otherwise be destroyed by such activities as other timber harvesting, road building or other construction, a prescribed fire treatment, or similar activities. Site-specific environmental analyses are required before any yew harvest takes place.

We recognize that other parts of the yew, such as seed or scion material, may be needed for research or propagation purposes. This decision permits non-destructive harvest (where tree or shrub is not killed) of small quantities of such material for these purposes in any area where allowed by forest plans, BLM resource management plans (draft or final), or new agency resource plans.

Under this alternative, 258,000 to 386,000 pounds of dry bark and/or 686,000 to 1,030,000 pounds of dry needles from an estimated 52,000 to 78,000 yew

would be available each year for harvest from National Forest System and BLM lands. These estimates are based on the number of yew per acre found in the 1992 Pacific yew inventory and the projected number of acres for timber sales described in forest plans and adjusted according to the FEIS for Management for the Northern Spotted Owl in National Forests (for Forest Service) or in draft resource management plans (for BLM). Many other decisions are currently being made that will most likely reduce the number of timber sale acres and therefore reduce the number of available yew trees and pounds of bark and needles. Under Alternative B, the production of yew from federal lands is largely dependent on the timber harvest program.

Alternative B provides for protection of some of the yew remaining after yew harvest; every sale unit would be regenerated to preharvest or prescribed levels. Special genetic reserves would not be established; however, all acres not committed to timber sales as defined above, would function as genetic reservoirs.

In summary, Alternative B emphasizes utilization of Pacific yew where it would otherwise be wasted. Production of yew would be dependent on the Forest Service and BLM timber harvest programs. It affords the highest degree of protection to the yew by virtue of allowing the lowest level of harvest (with the exception of Alternative A).

### Mitigation Measures

The mitigation measures in the FEIS were developed using "An Interim Guide to the Conservation and Management of Pacific Yew, as revised April 1993"<sup>3</sup> as well as suggestions from the public. They were designed to protect the yew and the ecosystem. All practical means to avoid or minimize environmental harm from the selected alternative have been adopted. The mitigation measures for Alternative B follow. These apply only to areas where yew is harvested for taxol.

## Appendix C

- If a timber sale is planned in a unique area where the only yew in the drainage is located in the sale area, then mitigation is required to assure the protection of this yew population. The purpose for this would be to protect the genetic importance of this unique population from timber sale unit locations.
  - Consider including vigorous, undamaged yew trees or shrubs in the green tree reserves whenever possible.
  - Harvest yew only where practical (i.e. sufficient number of stems of utilizable size).
  - Where yew harvest is planned, harvest yew in the sale unit prior to the harvest of other tree species, to the extent that timber harvesters' health and safety will not be jeopardized. Preharvesting may be accomplished by decking yew logs in specific locations within the sale unit during logging operations.
  - Harvest yew that is not in the residual green tree reserve.
  - Do not harvest yew for the primary purpose of yew products within 75 feet slope distance from the average high-water level of a perennial stream. Where forest plans, resource management plans, or other plans or prescriptions set wider streamside buffers, these greater buffers will be adhered to.
  - Site-specific prescriptions will identify logging systems, site preparation and fuels reduction treatments, and conifer regeneration plans with regard to yew survival and regeneration.
  - Use one or more of the following methods to maintain or replace yew on the site at preharvest levels. Where preharvest yew densities are estimated to be greater than 50 yew plants per acre, then a minimum of 50 yew plants per acre will be prescribed in site-specific prescriptions.
1. Retain and protect as much of the residual yew (stumps, trees, shrubs, advanced regeneration remaining after harvest) as possible and practical from post-harvest activities such as slash piling and burning. Plan logging systems and slash disposal methods which favor the survival of residual yew plants and stumps, e.g., grapple piling or combined machine and burning methods or special burn prescriptions. Include retention of yew and yew stumps as one of the

prescribed fire objectives in burning plans. Leave litter and down wood in those patches for seedling establishment.

Protect yew stumps by the following.

- a. To facilitate sprouting, leave yew tree stumps at the scientifically recommended height (currently 12" high). Yew shrubs should be cut to leave a similar length from the root collar.
  - b. Leave bark intact on yew stumps.
  - c. Whenever possible and practical, shade yew stumps with slash or adjacent vegetation and position reserve green trees to provide shade for yew stumps and advanced yew regeneration. Shading is not normally necessary on shrub form yew; site-specific analysis may help determine how much shading is needed.
2. Encourage natural regeneration (from seed already present on site) by using any site preparation methods known to favor yew seed germination and establishment. Site-specific prescriptions will provide seed sources and desired site conditions for natural regeneration of yew and protect concentrations of existing yew where feasible, while still meeting other management objectives. Where on-the-ground conditions preclude this, planting of yew will be prescribed.
  3. Plant seedlings according to site-specific prescriptions if prescribed regeneration of yew has not been achieved and there is assurance that regeneration by other means is not occurring. Obtain rooted cuttings or seed or seedlings from sources within the local management area. Cuttings could be collected before harvest. Animal protection measures need to be considered where browsing of young yew is predicted. Refer to "An Interim Guide to the Conservation and Management of Pacific Yew," page 27, for transfer of genetic material guidelines.

*Monitoring:* Where possible, monitor yew regeneration in conjunction with normal regeneration and other area surveys.

- *Endangered Species Act Consultation:* Yew harvest will be conducted in accordance with all conditions, restrictions, and monitoring procedures that are developed during project level Section 7 consultation required by the Endangered Species Act.
- *Seasonal Restrictions for Listed Species:* Pacific yew harvest will follow the appropriate seasonal restrictions for the affected listed species indicated during the project level (site-specific) Section 7 consultation required by the Endangered Species Act.
- *Utilization of Yew Material:* Follow current Forest Service and BLM policies for utilization of yew wood, bark, and needles. These policies may differ between Forest Service regions or national forests or between BLM districts.
- *Transfer of Yew, Administration of Permits, and Theft Prevention:* Follow current Forest Service and BLM policies for transfer of yew, administration of permits, and theft prevention.
- *Tribal Treaties:* Comply with all Native American tribal treaties and consult with tribes where yew harvest may impact trust lands.

## Monitoring

Monitoring yew harvest, yew survival and regeneration, and protection of other resources will be guided by Forest Service and BLM harvest policies and requirements in forest plans and resource management plans, as well as monitoring identified in site-specific analyses. The FEIS requires that yew regeneration be monitored in conjunction with other conifer regeneration surveys (Appendix B-1 in FEIS).

<sup>2</sup> Harvest method terminology may change. These terms maybe replaced with their equivalents using ecosystem management or other terminology.

<sup>3</sup> U.S. Department of Agriculture, Forest Service, 1992. An Interim Guide to the Conservation and Management of the Pacific Yew. Pacific Northwest Region. 78 p.





# Appendix D

## State Director Guidance for the RMP Process

According to Bureau regulations for preparing RMPs, "the State Director shall provide quality control and supervisory review, including plan approval, for plans and related environmental impact statements and shall provide additional guidance, as necessary, for use by District and Area Managers." "Guidance" means "any type of written communications or instructions that transmits objectives, goals, constraints or any other direction that helps District and Area Managers and staff know how to prepare a specific resource management plan."

Early in the process of concurrently preparing this RMP and five other RMPs which together cover all BLM-administered lands in western Oregon, the BLM State Director decided to develop comprehensive procedural guidance as planning criteria to assure consistent treatment of a variety of issues and concerns in the six plans. The intent to do this was conveyed to known interested parties in a mailer sent out by each BLM district office with planning responsibility on March 27, 1987. Suggestions for content of that guidance were solicited in the mailer.

There was limited public response, but that response, along with internal BLM recommendations, led to formulation of a proposed set of topics for State Director guidance. A mailer describing those topics were sent to the public for comment on August 11, 1987. Using further but still limited public comments, BLM modified its list of topics slightly and drafted Proposed State Director Guidance, which was sent out for public review by interested parties on May 13, 1988.

Although less than a hundred individuals and groups responded, many of the comments received were thoughtful and constructive, and addressed the proposals in depth. BLM undertook a substantial revision of many sections of the proposed guidance. This revision was done on a staggered schedule, to distribute the workload and provide timely guidance to the districts for each step in the process.

The first element of the guidance completed was Guidance for the Preparation of the Analysis of the Management Situation (AMS). This document summarizes important information about existing resource conditions, uses and demands, as well as about management activities and natural relationships. It provides the baseline for subsequent steps in the planning process, such as the design of alternatives and analysis of environmental consequences. The AMS also provides most of the data to be summarized in the "affected environment" chapter of the EIS. The AMS guidance prescribed minimum contents and table formats for the AMS for each plan. That guidance was essentially completed in October 1988, and slightly revised during 1989 and 1990.

A master glossary for the AMS was prepared as part of the State Director Guidance. It was completed in 1989, and later revised for inclusion in each Draft RMP.

The Guidance for Formulation of Alternatives was essentially completed in October 1990 but underwent modest revision during 1991 and 1992. A copy of the final version of this guidance is included in this appendix.

Two other sections, Guidance for Analytical Techniques Needed to Estimate Effects of Alternatives and Guidance for Use of the Completed Plan, were completed in July 1991, with slight modification of the former in 1992. Descriptions of complex analytical techniques have been appendicized to discussions of the relevant analyses in Chapters 3 and 4. The Use of the Completed Plan section was wrapped into the equivalent section of Chapter 2 of the Draft RMP/EIS.

The original draft guidance had two other sections that never became final. Guidance for the Executive Summary was dropped because the State Director's staff prepared that summary. Guidance for expressing consistency with plans, programs and policies of other agencies was never formalized, as BLM staff worked with state agencies and county planners until the Draft RMP/EISs were almost complete, on ways to express such consistency.





# Guidance for Formulation of Alternatives

## Introduction

The purpose of alternatives is to identify a range of reasonable combinations of resource uses and management practices that respond to planning issues and provide management direction for all resources. Five common alternatives will be addressed in each RMP, to provide a consistent set of distinct choices among potential management strategies.

A no change from the existing land use plan alternative will also be addressed. This is the "no action" alternative. In the other alternatives all existing land use decisions not found valid for continued implementation after 1990 (through an analysis summarized in the Analysis of the Management Situation), will be reconsidered.

Common alternatives that identify specific management actions along District boundaries will be consistent. Examples include elk management areas, spotted owl corridors or visual corridors.

This Guidance for Formulation of Alternatives may be modified later based on information identified in the districts' analyses of the management situation, or refinements that flow from the districts' site-specific development of common alternatives.

## Goals and Objectives of the Common Alternatives

The purpose of the goal and objective statements for the five common alternatives (A through E) is to guide development of specific criteria. Each alternative, if implemented, is intended to achieve or meet its goal. Goal and objective statements focus on general direction of alternatives rather than technical points in issue-related criteria for the alternatives. In each alternative all resource management values would be accommodated to the extent consistent with the primary goals and objectives for that alternative.

## Specific Guidance on Common Alternatives

The common alternatives would differ primarily in the way they allocate primary uses of lands (for example, lands allocated to intensive forest management, and lands allocated to protection of riparian zones).

The discussion on page 4 through part of pages 14 and 15 describes criteria for addressing each of the eleven planning issues in the formulation of the common alternatives. It also describes how land use allocations and management actions would vary in response to each issue. Within the specific constraints provided by the guidance for addressing each issue, the districts have flexibility to formulate the common alternatives as they consider appropriate to meet the goals and objectives of each alternative.

## Alternative A

## Alternative B

## GOALS:

Emphasize high production of timber and other economically important values on all lands to contribute to community stability.

Emphasize timber production to contribute to community stability consistent with the variety of other land uses such as fish and wildlife habitat, recreation, and scenic resources on O&C and CBWR lands. Give equal consideration to all resource values on public domain lands.

## OBJECTIVES:

- Produce the highest sustained yield of timber on all suitable forest lands legally available for harvest.
  - Contribute to ecological functions important to timber productivity and to habitat diversity to the extent possible consistent with the allocation for timber production.
  - Manage threatened and endangered species habitat as legally required.
  - Provide Research Natural Areas and eligible Areas of Critical Environmental Concern to the extent consistent with the allocation for timber production.
  - Manage appropriate Congressionally designated areas to maintain and enhance their scenic values.
  - Meet legal requirements for protection of wetlands and water quality, to protect anadromous fish habitat and other relevant values.
  - Emphasize substantial developed and dispersed motorized recreation uses.
  - Find no additional rivers suitable for designation under the Wild and Scenic Rivers Act.
  - Make land tenure adjustments which enhance BLM long-term sustained yield timber harvest opportunities.
  - Provide no special management in rural (residential) interface areas.
- Produce a high sustained yield of timber on O&C and CBWR lands, and on public domain lands where nontimber uses and values are of lesser importance than timber production.
  - Contribute to ecological functions important to timber productivity and to habitat diversity using a system that maintains old growth and mature forest in large and small blocks.
  - Protect habitat of all threatened and endangered species and species with high potential for listing. Protect habitat of other species of substantial concern to the extent consistent with high timber production.
  - Retain existing Research Natural Areas (RNAs) and Areas of Critical Environmental Concern (ACECs). Provide new ones from eligible areas to the extent consistent with the emphasis on timber production.
  - Manage scenic resources in selected areas of high recreation use.
  - Meet legal requirements for protection of wetlands and water quality and provide moderate additional protection for anadromous fish habitat, other substantial streams, and other water.
  - Provide for a wide range of developed and dispersed motorized recreation uses and opportunities, to minimize conflicts among recreation user groups.
  - Find eligible river segments suitable for designation as recreational, if they are important and manageable, and designation would not cause adverse economic impact.
  - Make land tenure adjustments which enhance BLM long-term sustained yield timber harvest opportunities on O&C and CBWR lands, and which benefit a variety of uses and values on public domain lands.
  - Adopt appropriate special forest management practices on BLM-administered lands intermingled with or adjacent to rural interface areas zoned for most dense residential occupancy.

## Alternative C

Provide timber production to contribute to community stability consistent with maintenance of biological diversity and the variety of other uses such as fish and wildlife habitat, recreation, and scenic resources on all lands.

- Produce a moderate sustained yield of timber.
- Provide biological diversity using a system that maintains some old growth and mature forest, focusing on protection of areas where special status plant and animal species cluster.
- Protect habitat of all threatened and endangered species and species with high potential for listing. Protect habitat of other species of substantial concern through emphasis on biological diversity and to the extent consistent with moderate timber production.
- Retain existing RNAs and ACECs. Provide new ones from eligible areas except where lands managed by others are considered to provide more appropriate opportunities.
- Manage scenic resources in selected high use areas, particularly emphasizing protection in corridors of existing and proposed wild and scenic rivers and major trails.
- Provide substantial protection for anadromous fish habitat, other substantial streams and other water environments.
- Provide for a wide range of recreation opportunities emphasizing dispersed use, while reducing conflicts among recreational user groups.
- Find eligible river segments suitable for designation as scenic or recreational, if they are important and manageable, but not suitable for designation as scenic if designation would cause adverse economic impact.
- Make land tenure adjustments to benefit a variety of uses and values.
- Adopt appropriate special forest management practices in rural interface areas zoned for moderate or high density residential occupancy.

## Alternative D

Emphasize protection and reestablishment of spotted owl habitat, along with management and enhancement of other values such as dispersed nonmotorized recreation opportunities and scenic resources, while sustaining some timber production.

- Produce a sustained yield of timber consistent with allocations for other uses and values.
- Protect habitat of the spotted owl in accordance with the Owl Conservation Strategy.
- Protect habitat of all threatened and endangered species, species with high potential for listing, and species of related concern.
- Retain all existing RNAs and ACECs. Provide new ones from eligible areas except where lands managed by others are considered to provide more appropriate opportunities.
- Manage all identified scenic resources.
- Provide substantial protection for wetlands and riparian areas along most streams and other water.
- Emphasize dispersed nonmotorized recreation opportunities.
- Find eligible river segments suitable for designation as wild, scenic or recreational, if they are important and manageable.
- Make land tenure adjustments which would emphasize enhancement of nontimber uses and values.
- Adopt special timber harvest and forest management practices in rural interface areas zoned for moderate or high density residential occupancy.

## Alternative E

Emphasize protection of older forests and management and enhancement of values such as dispersed nonmotorized recreation opportunities and scenic resources.

- Produce a sustained yield of timber consistent with allocations for other uses and values.
- Protect all old growth and older mature forests.
- Protect habitat of all threatened and endangered species, species with high potential for listing and species of related concern.
- Retain all existing RNAs and ACECs and designate all eligible areas.
- Manage all identified scenic resources and provide some visual resource protection for all lands.
- Manage all riparian areas and wetlands to maintain and improve water quality and fisheries habitat, and contribute to wildlife habitat diversity.
- Emphasize dispersed nonmotorized outdoor recreation opportunities.
- Find all eligible river segments suitable for designation as wild, scenic or recreational rivers.
- Make land tenure adjustments which would emphasize enhancement of nontimber uses and values.
- Adopt special timber harvest and forest management practices extensively buffering rural interface areas zoned for moderate or high density residential occupancy and other rural interface areas as appropriate.

## All Common Alternatives

## Alternative A

**Issue No. 1: Timber Production Practices:** Which forest lands should be available for timber management, and what practices should be used on those lands?

Guidance for All Common Alternatives: Lands allocated to intensive forest management under any of these alternatives would normally provide the highest nondeclining harvest level (even flow) of timber when the following conditions prevail:

- Effective silvicultural techniques (such as clear cutting, shelterwood or partial cutting) appropriate to the land allocations are used.
- All feasible site preparation and intensive management practices are applied.
- Anticipated merchantability is the only constraint on minimum average stand diameter slated for future harvest. (In some areas this may result in harvest of timber stands as young as 40 years for several decades during the early to middle part of the next century under some alternatives.)
- Adequate budgets are available to support the resultant timber sale program and allied intensive management practices, as well as scheduled monitoring linked to those activities.

The common alternatives assume these practices and conditions on the lands allocated to intensive timber management, but incorporate less intensive management practices on other available forest lands to the extent needed to be consistent with the allocation of those lands.

Where consistent with the goals and objectives of each alternative, the following silvicultural and harvest practices would be implemented on lands allocated primarily to timber management, to meet multiple land use objectives:

Minimize regeneration delay by reforesting harvested sites as soon as practical. Calculate an empirical regeneration period based on representative stocking survey results, expected timber sale contract lengths and management objectives.

Reforest harvested lands with indigenous commercial tree species. Emphasis would be placed on utilization of genetically improved stock in accordance with the Western Oregon Tree Improvement plan.

Manage tree seed orchards to produce adequate supplies of genetically improved seed.

Use available site preparation and seedling protection practices, including herbicides, using an integrated vegetation management approach. Emphasize those techniques that have proved most effective in assuring seedling survival and growth. (Actual practices will be based on site-specific analysis following completion of the RMP.)

Convert to conifers those lands classified as commercial forest lands presently occupied by grass, hardwoods and brush.

Allocate all forest lands for timber production consistent with the management direction for other resources (Issue Nos. 2 and 3, etc.) in this alternative, except the following:

Nonsuitable Woodland (See Figure 1-E-1 for Chart showing TPCC categories.)

## Alternative B

Allocate all forest lands for timber production consistent with the management direction for other resources in this alternative, except the following:

Nonsuitable Woodland  
Suitable Woodland - Low Site

## Alternative C

Allocate all forest lands for timber production consistent with the management direction for other resources, except the following:

Nonsuitable Woodland  
Suitable Woodland - Low Site  
Suitable Woodland -  
Nonsuitable Commercial  
Forest Land

## Alternative D

Allocate all forest lands for timber production consistent with the management direction for other resources, except the following:

Nonsuitable Woodland  
Suitable Woodland - All  
Categories

## Alternative E

Allocate all forest lands for timber production consistent with the management direction for other resources, except the following:

Nonsuitable Woodland  
Suitable Woodland - All  
Categories  
The Fragile Gradient-Restricted  
component of the Fragile  
Suitable TPCC category  
Site Class V

## All Common Alternatives

## Alternative A

## Issue No. 1 (Continued)

Plan hardwood sites for management of a sustained yield of hardwoods, where consistent with allocations for other uses or values.

Implement commercial thinning of present and future stands where practicable and where research indicates increased gains in timber production are likely.

Practice initial spacing control of seedlings/saplings through planting or thinning in conjunction with the control of competing vegetation, to maximize wood production by concentrating site resources in individual tree growth.

Plan nitrogen fertilization applications for all present and future stands where research indicates increased wood yields would result.

Plant specific root disease centers with resistant tree species.

Consider uneven-age management in stands where this method would be economically feasible and would maintain environmental values.

Consider efficiency of field operations and assurance of prompt reforestation in selecting the size of timber harvest units.

Apply proper soil management measures to maintain soil productivity.

## Issue Nos. 2 and 3: Old-Growth Forests and Habitat Diversity

To what extent and where should old-growth and/or mature forest habitats be retained, maintained or reestablished to meet various resource objectives? To what extent and where should BLM manage habitat to support populations of native wildlife species?

Any wildlife habitat management practice (such as nest boxes, road closures and forage seeding) not listed in the following could be implemented under any of the alternatives, as long as it is compatible with other management objectives. All special habitat features would be managed to protect their values. Mature and old-growth forests would be retained where Congressional designation of areas requires it. Snags and/or wildlife trees (to be converted to snags) would be retained where they occur on lands not allocated to timber harvest, except where public safety is a concern, and if left standing as nonmerchantable material on available forest lands. Where it would contribute to meeting wildlife tree objectives, create snags in areas not allocated primarily to timber production. A habitat goal of timber sale contracts would be to leave all snags and nonmerchantable trees that can be left consistent with safety considerations.

Mature and old-growth forests would be retained on most lands excluded from planned timber harvest by inclusion in the following allocations and TPCC categories:

Nonsuitable Woodland  
Riparian Management Areas  
Existing high-use recreation sites  
T&E species recovery areas where timber harvest is prohibited  
Wilderness Areas

## Alternative B

## Alternative C

## Alternative D

## Alternative E

Contribute to habitat diversity using a system that protects mature and old-growth forest in large and small blocks. Mature and old-growth components of the forest would be distributed in a corridor system by seed zone and elevation. In the corridor system large blocks of approximately 640 acres would be connected by a series of small, stepping stone blocks of approximately 80 acres, spaced at about one-mile intervals. Blocks would be limited to defined corridor areas.

Public Domain lands and the following allocations and TPCC categories on O&C and CBWR would receive priority for placement into the system, to the extent that they fit; for instance, if they provide needed habitat and are suitably located to contribute to the system.

Nonsuitable Woodland  
Suitable Woodland - Low Site  
Riparian Management Areas  
Recreation Sites  
T&E species recovery areas  
where timber harvest is  
prohibited  
Special Areas (Natural Areas,  
ACECs)  
Wilderness Areas

This alternative would provide for retention and improvement of biological diversity. Blocks of forest land at least 600 acres in size and, where relevant opportunities exist, at least 2500 acres in size (including cornering tracts) would be identified as old-growth restoration and retention areas, totalling 15 to 20 percent of BLM-administered forest land. Identification of these areas would focus on protection of older forest stands, connectivity between larger reserves and subregions, and protection of identified areas where special status plant and animal species cluster.

The remaining BLM-administered forest lands, not excluded from timber harvest to address other issues, would be subject to intermediate harvests for density management where feasible, to maintain open canopy conditions and promote retention of mixed species, as well as accelerate development of old-growth structure conditions and prepare the stands for regeneration

This alternative would manage habitats on BLM-administered lands to provide for a number and distribution of spotted owls that ensures continued existence of a well distributed population on those lands, so they may interact with spotted owls throughout the geographic range of the species, as recommended by the Conservation Strategy for the Northern Spotted Owl.

Suitable wildlife trees would be retained to contribute to the maintenance or attainment of cavity-dweller populations on BLM-administered lands at 60 percent of the optimum woodpecker population level. Wildlife tree and down log management practices would be used on the available forest lands, including but not limited to retention of green culls, snags and down logs. All special habitat features would be appropriately buffered.

This alternative would preserve the following:

- all existing forest stands over 150 years old.
- additional lands within 400 feet of the above stands, to assist in maintaining natural ecological elements, protect the older stands from edge effect and natural disaster, and interconnect them into a sustainable network.
- all suitable habitat forest stands which most closely match the lands within two miles of each spotted owl site occupied by a single or pair of owls in the last six years (1985-1990). In addition protect younger forest where needed to provide contiguous habitat within a mile of those sites.
- in each section where BLM administers at least half of the land, a 40-acre block of the oldest stands remaining, concentrated around headwaters streams, to provide habitat for amphibians and nesting for pileated woodpeckers.



All Common Alternatives

Alternative A

Issue Nos. 2 and 3 (Continued)

**Issue No. 4: Threatened and Endangered (and Other Special Status) Species Habitat**

What should BLM do to manage Federally listed threatened or endangered plants and animals and to prevent future Federal listing of plants and animals as threatened or endangered species?

Protect, monitor and manage habitats of Federal listed and proposed species in accordance with the Endangered Species Act and recovery plans, as legally required for self-sustaining survival.

Timber production constraints would be assumed in the formulation of the alternative only if critical habitat has been designated or there is a recovery or conservation plan within a month after completion of the Analysis of the Management Situation. Manage for the conservation of, and mitigate actions to protect habitats of, Federal Candidate, State Listed and Bureau Sensitive species where such actions would not diminish commercial use such as timber production.

**Issue No. 5: Special Areas**

What areas on BLM-administered lands need special management to prevent irreparable damage to important historic, cultural or scenic values; to protect botanical or fish and wildlife resources or other natural systems or processes; and to protect life and safety from natural hazards? Which of these areas should be formally designated as Areas of Critical Environmental Concern (ACEC)?

Any areas considered appropriate for Research Natural Area (RNA) designation would also be considered appropriate for ACEC designation.

Designate potential ACECs that meet criteria only if the relevant values are not protected by other authorities (e.g., Wild River designation, the Endangered Species Act). Existing ACECs and potential ACECs that meet the preceding standard, including RNAs and proposed RNAs, would be retained or designated on nonforest lands or unsuitable woodlands of no substantial mineral potential. Other existing ACECs and RNAs would be revoked.

## Alternative B

Suitable wildlife trees and/or snags would be retained to maintain, where possible, cavity-dweller populations at 40 percent of the optimum woodpecker population levels in new timber harvest units. Wildlife tree management practices would be used on the available forest lands, including retention only of green culls and snags.

Same as Alternative A, except protect habitats of Federal Candidate, State Listed and Bureau Sensitive Species to the full extent on public domain land, and protect habitats of Federal Candidate (i.e., Category 1 and 2) species known only to occur on BLM-administered lands to the extent considered necessary to prevent their federal listing.

Retain all existing ACECs and RNAs. Designate potential ACECs that meet criteria only if the relevant values are not protected by other authorities. Do not allocate new RNAs on available O&C or CBWR land if a similar feature can be protected on a National Forest. Designate all potential ACECs (including RNAs) on Public Domain lands, nonforest lands, nonsuitable woodlands, and other lands allocated to nontimber uses.

## Alternative C

harvest in the future. Regeneration harvests on these lands would be either heavy partial cuts (green-tree retention) or group selection cuts, and would not occur until after a stand had established old-growth characteristics.

The lands in old-growth restoration and retention areas, which have not attained old-growth characteristics, would be subject to similar density management, where feasible, until they attain such a condition.

Suitable wildlife trees would be retained to contribute to the maintenance or attainment of cavity-dweller populations on BLM administered lands at 60 percent of the optimum woodpecker population level. Wildlife tree and down log management practices would be used on the available forest lands, including but not limited to retention of green culls, snags and down logs. All special habitat features would be appropriately buffered.

Same as Alternative B except for additional protection of special status species provided by criteria for Issues 2 and 3.

Retain all existing ACECs and RNAs. Designate potential ACECs that meet criteria only if the relevant values are not protected by other authorities.

## Alternative D

Manage all BLM-administered lands to support the conservation and protection of all Federal Candidate, State Listed, and Bureau Sensitive species and their habitats.

Retain all existing and designate all potential ACECs.

## Alternative E

In addition to retention of wildlife trees on lands not allocated to timber management, suitable wildlife trees would be retained to contribute to the maintenance of cavity-dweller populations at 60 percent of the maximum potential population level on lands allocated to timber management. Wildlife tree and down log management practices would be used on the available forest lands, including but not limited to retention of green culls, snags and down logs. All special habitats would be appropriately buffered.

Same as Alternative D.

Same as Alternative D.

## All Common Alternatives

## Alternative A

**Issue No. 6: Visual Resources**

Which, if any, areas of BLM lands should be managed to reduce visual impacts or enhance visual (scenic) quality?

Note: Guidance for Issue 11 (Rural Interface Area Management) also addresses and defines visual resource management for Alternatives B, C, D and E in rural interface areas, except where this Issue 6 guidance sets a higher standard of visual resource management. Guidance for Issue 9A (Wild and Scenic Rivers) establishes criteria that will substantially dictate visual resource management by alternative in proposed wild and scenic river corridors. See Issue 9A and Issue 11 guidance for details.

Provide VRM Class I management within existing boundaries designated by Congress for exclusive management. Manage all other available (for timber harvest) forest land under VRM Class IV management objectives. Manage other lands as inventoried.

Provide VRM Class I management within

**Issue Nos. 7 and 8: Stream/Riparian/Water Quality**

Where and how should riparian zones be managed to protect and improve water quality, fisheries and wildlife habitat? What actions should be undertaken to comply with state water quality standards? What should BLM do to manage for special needs such as municipal and domestic use?

Guidance for All Common Alternatives: Establish Riparian Management Areas (RMAs) on perennial streams (generally, 3rd order and larger streams), lakes, ponds and other waters, to meet Oregon Forest Practices Act requirements and Oregon water quality standards. Typical average widths of RMAs by alternative are displayed in Table 1. Within those RMAs no lands would be considered "available" (to offer timber for sale as part of the allowable sale quantity). Some timber harvest may occur, however, to achieve resource management objectives. These activities may include road construction and yarding corridors across streams and riparian zones to facilitate timber harvest outside the RMA.

Logging, road building and site preparation methods would be designed to minimize the number and/or size of mass soil movements and to maintain the integrity of the RMAs. Other activities such as mining, recreation and ORV use would be regulated to protect water quality. Stream and riparian habitat improvement measures may be taken on any streams to improve water quality, fish habitat and/or wildlife habitat. Activities would be designed to meet Oregon Forest Practices Act (OFPA) requirements and Oregon water quality standards.

Protect wetlands in accordance with Executive Order 11988 and 11990.

Comply with written agreements with public water systems serving municipalities.

**Issue No. 9: Recreation Resources**

What areas or sites should be designed and/or managed to protect or enhance a variety of recreational opportunities?

Manage for dispersed recreation activities consistent with managed forest settings, including hunting, fishing, sightseeing, riding/hiking, and rafting. Maintain and manage existing recreation facilities which make available significant dispersed recreation opportunities, including recreation sites, boat ramps, trails, interpretive signs and related improvements. Manage existing Special Recreation Management Areas (SRMAs) and delineate Extensive Recreation Management Areas (ERMAs).

Manage existing high-use recreation sites and trails and expand them where needed. Close low use recreation sites and trails. Designate lands open to off-road vehicles (ORV) and leave roads open to motorized use, except where such designation would conflict with other allocations.

## Alternative B

existing boundaries designated by Congress for exclusive management. Manage as inventoried all available forest land adjacent to (within a quarter mile) developed recreation sites, state and federal highways, state scenic waterways, and rivers designated under the federal Wild and Scenic Rivers Act. Manage all other available forest land under VRM Class IV management objectives. Manage other lands as inventoried.

## Alternative C

Same as Alternative B, except on available forest land where BLM-administered land makes up more than half of a watershed, manage lands as inventoried.

## Alternative D

Manage all lands as inventoried.

## Alternative E

Same as Alternative D, except manage as VRM Class III all BLM-administered lands inventoried as Class IV; and manage as VRM Class I BLM-administered lands adjacent to (within a quarter mile) developed recreation sites, state and federal highways, state scenic waterways and rivers designated under the federal Wild and Scenic Rivers act.

Table 3-1. Riparian Management Areas

Stream Order	Average RMA Width* (each side of the stream in feet)				
	ALT. A	ALT. B	ALT. C	ALT. D	ALT. E
1					50
2				60	60
3	75	75	105	140	200
4	75	100	150	200	200
5	75	140	210	280	280
6	75	160	240	320	320
Lakes, Ponds & Other Waters	75	100	150	200	400

\* Actual RMA widths would be determined by on-the-ground riparian vegetation, terrain and stream characteristics, but would be a minimum of 50 feet on all 3rd order and larger streams. First and second order streams would have RMAs designated if perennial or if the beneficial uses warrant.

Same as Alternative A, except support the State's Regional Economic Development Plan for the geographic area, retain options for new SRMAs and high value potential recreation sites and trails on Public Domain lands, maintain and/or improve all existing developed recreation sites, and consider reopening sites closed in recent years.

Allocate and manage new SRMAs. Continue management of all existing recreation sites and trails, and consider reopening sites closed in recent years. Emphasize wildlife viewing, interpretation and related old-growth forest recreation opportunities, both to attract nonlocal visitors and to serve local users. Retain options for future development of high value potential sites, trails and sightseeing opportunities. Impose additional ORV limitations or road closures to protect wildlife habitat or old-growth forest recreation opportunities, minimize conflicts with hikers and horseback riders, or meet other resource objectives.

Same as Alternative C, except manage for an optimum range of nonmotorized recreation. Retain options for future development of recreation sites and facilities for dispersed recreation opportunities. Retain existing pockets of old-growth forest that are both adjacent to and accessible from existing or potential recreation areas. Prohibit ORV and road use as appropriate to improve wildlife habitat or protect the ecosystem.

Same as Alternative D.

## All Common Alternatives

## Alternative A

## Issue No. 9A: Wild and Scenic Rivers

What, if any, rivers should be found suitable for designation?

Provide interim protection for all river segments determined to be suitable, until Congressional action on BLM plan recommendations. Interim protection should be appropriate to the highest category for which the river is determined to be suitable. Manage Congressionally designated rivers consistent with their designation.

No rivers found suitable for designation under any classification.

## Issue No. 10: Land Tenure

In what areas would BLM-administered lands be sold, exchanged or transferred out of federal ownership under other authorities to improve management efficiency and benefit resource program objectives? In what areas would BLM attempt to acquire lands to improve management efficiency and benefit resource program objectives?

A major lands program effort would use exchanges to consolidate land ownership patterns to benefit one or more of the resources managed, such as timber, watershed, wildlife habitat, recreation, cultural, botanical, and minerals.

Land tenure adjustment would be guided by a three-zone concept utilizing the following standards:

Zone 1 includes areas currently identified as having high public resource values, and other efficiently managed lands. The natural resource values may require protection by federal law, Executive Order or policy. These lands may have other values or natural systems which merit long term public ownership. They do not meet the criteria for sale under FLPMA Section 203(a) and would generally be retained in public ownership. The Zone 1 boundaries should be relatively close to or on BLM property lines except where the intent is to show preferred acquisition areas.

Zone 2 includes lands that are suitable for exchange because they form discontinuous ownership patterns, are less efficient to manage than Zone 1 lands, and may not be accessible to the general public. Where appropriate opportunities are identified, these BLM-administered lands may be exchanged for other lands in Zones 1 or 2, transferred to other public agencies, or given some form of cooperative management. These lands would not be expected to meet the criteria for sale under Section 203(a), and would not be identified as suitable for such sale.

Zone 3 includes lands that are scattered and isolated with no known unique natural resource values. Zone 3 lands are available for use in exchanges for private inholdings in Zone 1 (high priority) or Zone 2 (moderate priority). They are also potentially suitable for disposal through sale. Exchanges would be made to acquire lands which would enhance the nondeclining harvest level of the commercial forest land managed by BLM, by improving age class distribution or other harvest level determination factors. Factors to consider include site quality, access to public forest land, logical logging units, and management of public forest land to facilitate timber harvest. No exchanges would be made to acquire lands more valuable for nontimber uses. No commercial timberland would be sold or leased. Leases or conveyance of land in Zones 2 and 3 other than commercial timberland would be made under the Recreation and Public Purposes Act to provide appropriate facilities or services.

## Alternative B

No rivers found suitable for designation as wild or scenic. River segments eligible for wild, scenic or recreational classification found suitable for designation as recreational, if all of the following circumstances exist:

- no net adverse economic impacts on the local economy.
- river segment possesses at least one outstandingly remarkable value for which it is considered by BLM to be the top river in the State Comprehensive Outdoor Recreation Plan (SCORP) region.
- BLM can effectively manage the outstanding values of the river segment.

Exchanges of O&C and CBWR lands would be made primarily to acquire lands which would enhance timber management opportunities. Exchanges of public domain lands would be made to benefit one or more of the resources managed, including nontimber values. Sale of O&C and CBWR lands other than available commercial forest lands, and of public domain lands, would be made to dispose of lands that meet any of the criteria of FLPMA Section 203(a). Leases on such lands would be made to accommodate other uses. Leases or conveyances under the Recreation and Public Purposes Act would be made in Zones 2 and 3 to provide appropriate facilities or services.

## Alternative C

River segments eligible for scenic or recreational river status found suitable for designation consistent with their highest potential classification, and river segments eligible for wild classification found suitable for designation as scenic, if all of the following circumstances exist. If only the economic impact test is not met, find suitable for designation as recreational,

- no net adverse impacts on the local economy.
- river segment possesses at least one outstandingly remarkable value for which it is considered by BLM to be among the top two rivers in the SCORP region.
- BLM can effectively manage the outstanding values of the river segment.

Same as Alternative B, except emphasis would also be given to exchanges of O&C and CBWR lands that would contribute to conservation of biological diversity.

## Alternative D

Eligible river segments found suitable for designation consistent with their highest potential classification if the following circumstances exist.

- river segment possesses at least one outstandingly remarkable value for which it is considered by BLM to be among the top four rivers in the SCORP region.
- BLM can effectively manage the outstanding values of the river segment.

Land exchanges would be made to benefit one or more of the resources managed. Exchanges involving disposal of timber to acquire lands containing greater nontimber values would be emphasized. Sales of lands other than available commercial forest lands would be made to dispose of lands that meet criteria (1) or (2) of FLPMA Section 203(a), but sales of land that meet only criterion (3) would not be made. No lands would be leased, except leases and conveyances under the Recreation and Public Purposes Act would be made in Zones 2 and 3 to provide facilities or services for the benefit of the public.

## Alternative E

All eligible river segments found suitable for designation consistent with their highest potential classification.

Same as Alternative D.

---

All Common Alternatives

Alternative A

---

Issue No 10. (Continued).

under FLPMA Section 203(a) if important recreation, wildlife, watershed, threatened or endangered species habitat, and/or cultural values are not identified during disposal clearance reviews and no viable exchange proposals for them can be identified. The discussion of Zone 3 lands must state which of the disposal criteria in FLPMA, Section 203(a), apply. Zone 3 lands would also be available for transfer to another agency or to local governments, as needed to accommodate community expansion and other public purposes.

Issue No. 11: Rural Interface Area Management

No special management actions except those that address other issues.

Which BLM-administered lands should be allocated to receive special management practices due to the concerns of residents who live in close proximity? (Rural interface areas are areas where BLM-administered lands are adjacent to or intermingled with privately owned lands where county zoning has created or allows for creation of lots as small as 1 to 20 acres. In most rural interface areas concerns of the residents are related to forest management practices, visual quality and potential effects on domestic water sources and water supplies.)



## Alternative B

## Alternative C

## Alternative D

## Alternative E

On BLM-administered lands within one quarter mile of private lands in identified rural interface areas zoned for 1 to 5-acre lots, customary forest management practices would be altered, where realistically feasible, to mitigate the adjacent neighbors' concerns (i.e., management would look for alternative methods of practicing intensive forest management). Examples of management options include harvest regimes other than clearcutting, hand application rather than aerial application of herbicides and pesticides, inclusion of additional buffers for domestic water sources, and hand piling slash for burning as opposed to broadcast burning. All BLM-administered lands within a quarter mile of designated rural interface areas 1 to 5-acre lots) would be managed for VRM class III objectives.

Same as Alternative B except that lands zoned for 1 to 20-acre lots would also be included as the rural interface area.

On BLM-administered lands within one quarter mile of private lands in rural interface areas zoned for 1 to 20-acre lots, there would be no herbicide spraying, no clear cutting, and no prescribed burning. BLM-administered lands within this area would be managed for VRM class II objectives.

Same as Alternative D except BLM-administered lands within one half mile of private lands in rural interface areas would be managed as discussed in Alternative D. Areas zoned for lots larger than 20 acres, but with tax lots of 20 acres or less and/or existing legal multiple residences, may also be addressed in this alternative.



# Appendix E

## Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl

This appendix consists of the Record of Decision and its Attachment A, published in April 1994, for the *Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl*. It is referred to in this PRMP/FEIS as the SEIS ROD or as the ROD in the SEIS.

The FSEIS ROD is bound separately from the PRMP/FEIS and is incorporated by reference. The Draft and Final SEIS and the FSEIS ROD were sent to those who received copies of the Medford District Draft

Resource Management Plan and Environmental Impact Statement. It was also sent to agencies, libraries, and others who requested it. And it is also available upon request.

To obtain a copy of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, send a request in writing to:

Regional Ecosystem Office  
P.O. Box 3623  
Portland, Oregon 97208-3623



# Appendix F

## Best Management Practices

### Table of Contents

- I. Introduction
  - A. Purpose
  - B. Organization and Use
- II. Watershed Analysis
- III. Project Planning and Design
  - A. Planning
  - B. Design
  - C. Maps/Contract Requirements
  - D. Cumulative Impacts
- IV. Riparian Reserves
- V. Wetlands
- VI. Fragile Soils
  - A. Roads
  - B. Timber Harvest
  - C. Silviculture
  - D. Wildfire
  - E. Rights-of-Way
- VII. Roads and Landings
  - A. Planning
  - B. Location
  - C. Design
    - 1. General
    - 2. Surface Cross Drain Design
    - 3. Permanent Stream Crossing Design
    - 4. Temporary Stream Crossing Design
    - 5. Low Water Ford Stream Crossing Design
  - D. Construction
    - 1. Roadway Construction
    - 2. Permanent Stream Crossing Construction
    - 3. Temporary Stream Crossing Construction
    - 4. Low Water Ford Stream Crossing Construction
  - E. Landings
  - F. Road Erosion Control
  - G. Road Renovation/Improvement
  - H. Road Maintenance
  - I. Dust Abatement
  - J. Road Access Restrictions
  - K. Road and Landing Decommissioning
  - L. Water Source Development
  - M. Rock Quarry Reclamation

**VIII. Timber Harvest**

- A. Yarding Methods
  - 1. Cable
  - 2. Tractor
  - 3. Helicopter
  - 4. Horse
- B. Erosion Control for Timber Harvest
  - 1. Waterbars
  - 2. Revegetation of Disturbed Areas

**IX. Silviculture**

- A. Site Preparation
  - 1. Gross Yarding
  - 2. Prescribed Fire - Broadcast Burn
    - a. General Guidelines
    - b. Firelines
  - 3. Prescribed Fire - Piling
    - a. Hand Piling
    - b. Tractor Piling
- B. Fertilization

**X. Special Forest Products**

- A. Roads
- B. Harvest
  - 1. Yarding Methods

**XI. Mineral Development**

- A. Locatable Operations
- B. Saleable Operations

**XII. Livestock Grazing**

**XIII. Wildfire**

- A. Prevention
- B. Suppression
- C. Rehabilitation

**XIV. Watershed Restoration**

- A. Roads
- B. Riparian Vegetation
- C. In-Stream Habitat Structures
- D. Uplands

**XV. References**

- Table 1 - A Guide for Placing Common Soil and Geologic Types into Soil Erosion and Soil Infiltration Classes to Space Lateral Road Drainage Culverts
- Table 2 - A Guide for Maximum Spacing of Lateral Drainage Culverts by Soil Erosion Classes and Road Grade

# I. Introduction

## A. Purpose

Best management practices (BMPs) are required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987) to reduce nonpoint source pollution to the maximum extent practicable. BMPs are considered the primary mechanisms to achieve Oregon water quality standards.

Best management practices are defined as methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation).

Nonpoint sources of pollution result from natural causes, human actions, and the interactions between natural events and conditions associated with human use of the land and its resources. Nonpoint source pollution is caused by diffuse sources rather than from a discharge at a specific single location. Such pollution results in alteration of the chemical, physical, and biological integrity of water. Erosion from a harvest unit or surface erosion from a road are some examples of nonpoint sources.

The BMPs in this document are a compilation of existing policies and guidelines and commonly employed practices designed to maintain or improve water quality. Objectives identified in this BMP Appendix also include maintenance or improvement of soil productivity and fish habitat since they are closely tied to water quality. Selection of appropriate BMPs will help meet Aquatic Conservation Strategy objectives during management action implementation. Practices included in this Appendix supplement the Standards and Guidelines from the SEIS ROD and they should be used together.

## B. Organization and Use

This document is organized by management activities plus separate sections that address activity planning and design, riparian reserves, wetlands, and fragile soils. Objectives are stated under each management activity followed by a list of practices designed to achieve the objectives.

BMPs are selected and implemented as necessary based on site-specific conditions to meet water quality, soil, or fish objectives for specific management actions. BMPs and Standards and Guidelines from the SEIS ROD may be modified to meet site specific situations. This Appendix does not provide an exhaustive list of BMPs. Additional nonpoint source control measures may be identified during watershed analysis or during the interdisciplinary process when evaluating site-specific management actions. Implementation and effectiveness of BMPs need to be monitored to determine whether the practices are correctly designed and applied to achieve the objectives. BMPs will be adjusted as necessary to ensure objectives are met.

Review and update of this Appendix will be an ongoing process. Updates will be made as needed to conform with changes in Bureau of Land Management policy, direction, or new information.

# II. Watershed Analysis

Information on watershed analysis is found in many documents including the Standards and Guidelines on p. B-20 in the SEIS ROD, the FY 1994-96 Watershed Analysis Guidelines, A Federal Agency Guide for Pilot Watershed Analysis, and BLM Information Bulletins Nos. OR-93-478, OR-93-605, and OR-94-106. This analysis is intended to enable watershed planning that achieves Aquatic Conservation Strategy objectives. Watershed analysis will serve as the basis for BMP design during project-specific planning.



## III. Project Planning and Design

### A. Planning

**Objective:** To include soil productivity, water quality, and hydrologic considerations in project planning.

- Practices:**
1. Use information from watershed analysis to prepare project level plans.
  2. Use timber production capability classification (TPCC) inventory to identify areas classified as fragile due to slope gradient, mass movement potential, surface erosion potential, and high ground water levels.
  3. Use the planning process to identify, evaluate, and map potential problems (e.g., slump prone areas, saturated areas and slide areas) that were not addressed in the watershed analysis.
  4. Analyze watershed cumulative impacts and provide mitigation measures if necessary to meet water quality requirements (see section III.D.).
  5. Use watershed analysis information to determine potential for natural and activity-created high intensity wildfires at the project level. Reduce potential for high intensity wildfires through proposed management activities.

### B. Design

**Objective:** To ensure that management activities maintain favorable conditions of soil productivity, water flow, water quality, and fish habitat.

- Practices:**
1. Design proposed management activities to mitigate potential adverse impacts to soil and water. Evaluate factors such as soil characteristics, watershed physiography, current watershed and stream channel conditions, proposed roads, skid trails, logging system design, etc., to determine impacts of proposed management activities.
  2. Design mitigation measures if adverse impacts to water quality/quantity or soil productivity may result from the proposed action.

### C. Maps/Contract Requirements

**Objective:** To identify riparian reserves to be protected and to ensure their protection on the ground.

- Practices:** Include the following on activity maps and/or contracts:
1. Locate all stream channels, lakes, ponds, reservoirs, and wetlands (springs, bogs, etc.) with appropriate riparian reserves on project map and/or contracts.
  2. Include protection required for identified water bodies on project maps and/or contracts.

## D. Cumulative Impacts

**Objective:** To minimize detrimental impacts on water and soil resources resulting from the cumulative impact of land management activities within a watershed.

- Practices:**
1. Coordinate scheduling of management activities such as timber sales, road construction, and watershed restoration activities with other landowners in the watershed.
  2. Use watershed analysis results to identify watersheds with a high level of cumulative impacts.
    - a. Use the following general guidelines to delineate watersheds for cumulative impacts analyses.
      1. Natural drainage boundaries.
      2. Third to fifth order drainages (approximately 500 to 10,000 acres).
      3. Lower boundary location based on a state-designated beneficial use.
    - b. The extent to which any or all of the following criteria exist would determine which watersheds have a high risk for water quality degradation due to cumulative impacts. The criteria are not listed in order of priority.
      1. Highly erodible soils (i.e., subject to surface erosion, landslides, or slumps).
      2. Large percent of forest vegetation harvested.
      3. Large area of compacted soil.
      4. Large percent of nonrecovered openings in transient snow zone.
      5. High sedimentation potential.
      6. Poor to fair channel stability or condition.
      7. Poor to fair riparian condition (nonfunctional or functional-at risk with downward trend).
      8. High impact from catastrophic event (e.g., wildfire).
      9. High road density.
      10. Potential for adverse impact on a beneficial use.
      11. Monitoring data shows that water quality does not meet state water quality standards.
      12. Beneficial use impairment identified in DEQ's nonpoint source assessment and 305 (b) reports.
  3. For watersheds identified as having a high risk for water quality degradation, an intensive evaluation should follow the initial analysis and include the nature of the problem, the cause of the problem, and a specific plan with objectives and alternatives for recovery and mitigation. Water monitoring may also be initiated to validate the conclusion of the impact analysis and to establish baseline data.
  4. Based on site-specific conditions, select and apply special management practices such as the following to mitigate water quality impacts in high risk watersheds.
    - a. Develop and implement a watershed/riparian restoration plan and encourage coordination with landowners.
    - b. Require plans of operation for mining and rights-of-way. Require a management plan for grazing.
    - c. Defer the watershed from management activities which would potentially degrade water quality for approximately five years. Reanalyze the watershed.
    - d. Increase widths of Riparian Reserves.

- e. Utilize ecosystem based concepts (as defined in the resource management plan) for timber harvest.
- f. Require helicopter logging.
- g. Require full suspension cable yarding.
- h. Require seasonal restrictions with no waivers for timber falling and yarding.
- i. Minimize existing and prevent additional road caused impacts:
  - reduce road density;
  - minimize road width and clearing limits;
  - require transport of excavated materials to appropriate disposal site (end hauling);
  - prohibit new road construction;
  - no unsurfaced roads;
  - require seasonal restrictions with no waivers for construction, renovation, and hauling;
  - require special low impact maintenance and construction techniques;
  - no roadside brushing/grubbing with excavator;
  - no blading and ditch pulling in the winter unless essential to provide drainage;
  - rock ditch lines;
  - pull back sidecast from road construction and recontour roadway; and
  - remove culverts and reshape drainageway crossings.
- j. Restrict or officially close the watershed to off-highway vehicle use and enforce the closure.
- k. Implement regular compliance reviews on all activities in the watershed.
- l. Assess trade-offs between wildfire suppression impacts and wildfire damage; plan suppression levels accordingly. Limit use of heavy equipment during wildfire suppression.

## IV. Riparian Reserves

**Objective:** To meet the Aquatic Conservation Strategy objectives in the Standards and Guidelines on p. B-11 in the SEIS ROD.

- Practice:**
1. Comply with Riparian Reserve widths described in the Standards and Guidelines on p. B-12 and p. C-30 in the SEIS ROD.
  2. Follow the Standards and Guidelines for Riparian Reserves on p. C-31 in the SEIS ROD.

## V. Wetlands

**Objective:** To meet the Aquatic Conservation Strategy objectives in the Standards and Guidelines on p. B-11 in the SEIS ROD.

- Practices:**
1. Comply with Riparian Reserve widths described in the Standards and Guidelines on p. B-12 and p. C-30 in the SEIS ROD.
  2. Follow the Standards and Guidelines for Riparian Reserves on p. C-31 in the SEIS ROD.

## VI. Fragile Soils

**Objective:** To minimize surface disturbance on fragile suitable commercial forestland.

The BMPs in this section are to be used in addition to those in other sections.

Four categories of fragile soils sensitive to surface-disturbing activities are identified in Medford District's timber production capability classification (TPCC):

- Fragile Slope Gradient (FG)** - These sites consist of steep to extremely steep slopes that have a high potential for surface ravel. Gradients commonly range from 60 to greater than 100 percent.
- Fragile Mass Movement (FP)** - These sites consist of deep seated, slump, or earth flow types of landslides with undulating topography and slope gradients generally less than 60 percent. Soils are derived from volcanic tuffs or breccias.
- Fragile Surface Erosion (FM)** - These sites have soil surface horizons that are highly erodible. Soils are derived from granite or schist bedrock.
- Fragile Groundwater (FW)** - These sites have high water tables where water is at or near the soil surface for sufficient periods of time that vegetation survival and growth are affected.

### A. Roads

#### 1. Planning

**Practice:** 1. Avoid fragile soils when planning road systems.

#### 2. Design

**Practices:** 1. Design haul roads with rock surface on FM, FP, and FW soils.

- 2. Use slotted risers, trash racks, or over-sized culverts to prevent culvert plugging on FM and FP soils.

#### 3. Erosion Control

- Practices:**
- 1. Stabilize cutbanks, fillslopes, and ditchlines on FM soils using methods such as vegetation (grass seeding, deep rooted plants, etc.), terracing, rock buttressing, and rock armoring ditchlines.
  - 2. Stabilize cutbanks on FP soils using rock buttressing.
  - 3. Decommission or obliterate temporary spur roads as appropriate for site-specific condition using methods such as scarifying the road bed, planting tree seedlings or grass, restoring the natural ground contour, and water barring.

#### 4. Maintenance

**Practice:** 1. Minimize ditch cleaning on FM and FP soils to retard slumping of road and cutbanks.

#### 5. Access Restrictions

Practice: 1. Block unsurfaced roads on fragile soils to prohibit motorized vehicle use.

## **B. Timber Harvest**

### **1. Yarding Methods - Cable**

Practices: 1. Use full or partial suspension when yarding on FG, FM, and FW soils.

2. Construct hand waterbars in cable yarding corridors on FM soils where gouging occurs immediately after use according to guidelines in Section VII.D.1.

3. Restrict yarding and hauling to dry season (generally May 15 to October 15) on FM, FP, and FW soils.

### **2. Yarding Methods - Tractor**

Practice: 1. Avoid tractor yarding.

### **3. Yarding Methods - Helicopter**

Practice: 1. Employ helicopter yarding to avoid or minimize new road construction on fragile soils.

## **C. Silviculture**

### **1. Prescribed Fire - Underburn**

Practice: 1. Prescribe cool burns and only burn in the spring on FG and FM soils.

### **2. Prescribed Fire - Piling**

#### **a. Hand**

Practices: 1. Put slash in yarding corridors on FG and FM soils to control erosion, allowing adequate space to plant trees.

2. Burn handpiles on FG and FM soils only if they prevent planter access.

#### **b. Machine**

Practice: 1. Avoid machine piling or ripping on FM, FP, and FW soils.

## **D. Wildfire**

### **1. Suppression**

Practices: 1. Apply suppression on fragile soils based on environmental and operational conditions that exist at time of ignition.

2. Limit the use of tractors and other major surface-disturbing activities on all fragile soils.

### **2. Rehabilitation**

Practice: 1. Assure prompt rehabilitation on fragile soils through seeding or planting of native species.

## **E. Rights-of-Way**

- Practices:**
1. Avoid facility construction on FM and FP soils.
  2. Design rights-of-ways to minimize surface disturbance on FM and FP soils.

# **VII. Roads and Landings**

## **A. Planning**

**Objective:** To plan road systems that meet resource objectives and minimize detrimental impacts on water and soil resources.

- Practices:**
1. Use an interdisciplinary team to develop an overall transportation system.
  2. Establish road management objectives that minimize adverse environmental impacts.
  3. Avoid fragile and unstable areas.
  4. Encourage use of BMPs where not specifically required in reciprocal right-of-way agreements.

## **B. Location**

**Objective:** To minimize soil erosion, water quality degradation, and disturbance of riparian vegetation.

- Practices:**
1. Locate roads on stable positions (e.g., ridges, natural benches, and flatter transitional slopes near ridges and valley bottoms). Implement extra mitigation measures when crossing unstable areas is necessary.
  2. Avoid headwalls, midslope locations on steep unstable slopes, seeps, old landslides, slopes in excess of 70 percent, and areas where the geologic bedding planes or weathering surfaces are inclined with the slope.
  3. Locate roads to minimize heights of cutbanks. Avoid high, steeply sloping cutbanks in highly fractured bedrock.
  4. Locate roads on well-drained soil types. Roll the grade to avoid wet areas.
  5. Locate stream crossing sites where channels are well defined, unobstructed and straight.

## **C. Design**

### **1. General**

**Objective:** To design the lowest standard of road consistent with use objectives and resource protection needs.

- Practices:**
1. Base road design standards and design criteria on road management objectives such as traffic requirements of the proposed activity and the overall transportation plan, an economic analysis, safety requirements, resource objectives, and the minimization of damage to the environment.

2. Consider future maintenance concerns and needs when designing roads.
3. Preferred road gradients are 2 to 10 percent with a maximum grade of 15 percent. Consider steeper grades in those situations where they will result in less environmental impact. Avoid grades less than 2 percent.
4. Road Surface Configurations
  - a. Outslipping - sloping the road prism to the outside edge for surface drainage is normally recommended for local spurs or minor collector roads where low volume traffic and lower traffic speeds are anticipated. It is also recommended in situations where long intervals between maintenance will occur and where minimum excavation is desired. Outslipping is not recommended on gradients greater than 8 to 10 percent.
  - b. Inslipping - sloping the road prism to the inside edge is an acceptable practice on roads with gradients more than 10 percent and where the underlying soil formation is very rocky and not subject to appreciable erosion or failure.
  - c. Crown and Ditch - this configuration is recommended for arterial and collector roads where traffic volume, speed, intensity and user comfort are a consideration. Gradients may range from 2 to 15 percent as long as adequate drainage away from the road surface and ditchlines is maintained.
5. Minimize excavation through the following actions: use of balanced earthwork, narrow road width, and endhauling where slopes are greater than 60 percent.
6. Locate waste areas suitable for depositing excess excavated material.
7. Conduct slope rounding on tops of cut slopes in clayey soils to reduce sloughing and surface ravel. Avoid this practice in erosion classes I, II, VII and VIII (see Table 1).
8. Surface roads if they will be subject to traffic during wet weather. The depth and gradation of surfacing will be determined by traffic type, frequency, weight, maintenance objectives, and the stability and strength of the road foundation and surface materials.
9. Provide vegetative or artificial stabilization of cut and fill slopes in the design process. Avoid establishment of vegetation where it inhibits drainage from the road surface or where it restricts safety or maintenance.
10. Prior to completion of design drawings, field check the design to assure that it fits the terrain, drainage needs have been satisfied, and all critical slope conditions have been identified and adequate design solutions applied.

## 2. Surface Cross Drain Design

**Objective:** To design road drainage systems that minimize concentrated water volume and velocity and therefore to reduce soil movement and maintain water quality.

- Practices:**
1. Design cross drains in ephemeral or intermittent channels to lay on solid ground rather than on fill material to avoid road failures.
  2. Design placement of all surface cross drains to avoid discharge onto erodible (unprotected) slopes or directly into stream channels. Provide a buffer or sediment basin between the cross drain outlet and the stream channel.
  3. Locate culverts or drainage dips in such a manner to avoid discharge onto unstable terrain such as headwalls, slumps, or block failure zones. Provide adequate spacing to avoid



accumulation of water in ditches or surfaces through these areas.

4. Provide energy dissipators (e.g., rock material) at cross drain outlets or drain dips where water is discharged onto loose material or erodible soil or steep slopes.
5. Place protective rock at culvert entrance to streamline water flow and reduce erosion.
6. Use the guide for drainage spacing by soil erosion classes and road grade shown in Tables 1-A and 2-A.
7. Use drainage dips in place of culverts on roads that have gradients less than 10 percent or where road management objectives result in blocking roads. Avoid drainage dips on road gradients greater than 10 percent.
8. Locate drainage dips where water might accumulate or where there is an outside berm that prevents drainage from the roadway.
9. When sediment is a problem, design cross drainage culverts or drainage dips immediately upgrade of stream crossings to prevent ditch sediment from entering the stream.
10. Rolling gradients is recommended in erodible and unstable soils to reduce surface water volume and velocities and culvert requirements.

### 3. Permanent Stream Crossing Design

**Objective:** To prevent stream crossings from being a direct source of sediment to streams thus minimizing water quality degradation; to provide unobstructed access to spawning and rearing areas for anadromous and resident fish.

- Practices:**
1. Use pipe arch culverts on most fishery streams. Use bottomless arch culverts and bridges where gradients greater than 5 percent, stream discharge, and value of the fishery resource dictate special engineering considerations necessary to ensure uninterrupted fish passage.
  2. Minimize the number of crossings on any particular stream.
  3. Where feasible, design culvert placement on a straight reach of stream to minimize erosion at both ends of the culvert. Design adequate stream bank protection (e.g., rip-rap) where scouring would occur. Avoid locations that require a stream channel to be straightened beyond the length of a culvert to facilitate installation of a road crossing.

### 4. Temporary Stream Crossing Design

**Objective:** To design temporary stream crossings that minimize disturbance of the stream and riparian environment.

- Practices:**
1. Evaluate the advantages and disadvantages of a temporary versus permanent crossing structure for access to the area during all seasons over the long term in terms of economics, maintenance, and resource requirements.
  2. Design temporary structures such as prefabricated temporary timber bridges, multiple culverts with minimum fill height, cattle guard crossings, or log cribs to keep vehicles out of the stream.
  3. Minimize the number of temporary crossings on a particular stream.
  4. Avoid temporary stream crossings on fishery streams.

5. Low Water Ford Stream Crossing Design

**Objective:** To design low water fords that minimize disturbance of the stream and riparian environment.

**Practice:** Use only when site conditions make it impractical or uneconomical to utilize a permanent or temporary crossing structure.

## D. Construction

**Objective:** To create a stable roadway while minimizing soil erosion and potential water quality degradation.

1. Roadway Construction

- Practices:**
1. Limit road construction to the dry season (generally between May 15 and October 15). When conditions permit operations outside of the dry season, keep erosion control measures current with ground disturbance to the extent that the affected area can be rapidly closed/ blocked and weatherized if weather conditions warrant.
  2. Manage road construction so that any construction can be completed and bare soil can be protected and stabilized prior to fall rains.
  3. Confine preliminary equipment access (pioneer road) to within the roadway construction limits.
  4. Construct pioneer road so as to prevent undercutting of the designated final cutslope and prevent avoidable deposition of materials outside the designated roadway limits. Conduct slope rounding at the first opportunity during construction to avoid excess amounts of soil being moved after excavation and embankment operations are completed.
  5. Use controlled blasting techniques that minimize amount of material displaced from road location.
  6. Construct embankments, including waste disposal sites, of appropriate materials (no slash or other organic matter) using one or more of the following methods:
    - a. layer placement (tractor compaction),
    - b. layer placement (roller compaction), and
    - c. controlled compaction (85 to 95 percent maximum density).

Slash and organic material may remain under waste embankment areas outside the road prism and outside units planned for broadcast burning.

7. Avoid sidecasting where it will adversely effect water quality or weaken stabilized slopes.
8. Provide surface drainage prior to fall rains.
9. Clear drainage ditches and natural watercourses of woody material deposited by construction or logging above culverts prior to fall rains.

2. Permanent Stream Crossing Construction

- Practices:**
1. Confine culvert installation to the low flow period (generally June 15 to September 15) to minimize sedimentation and the adverse effects of sediment on aquatic life.
  2. Divert the stream around the work area to minimize downstream sedimentation.

3. Install culverts as close to zero percent slope as possible on fishery streams but not in excess of 0.5 percent. Place culverts in the streambed at the existing slope gradient on larger nonfishery streams. Place energy dissipators (e.g., large rock) at the outfall of culverts on small nonfishery streams to reduce water velocity and minimize scour at the outlet end.
4. Countersink culvert 6 to 8 inches below the streambed to minimize scouring at the outlet. Increase culvert diameters accordingly.
5. Limit activities of mechanized equipment in the stream channel to the area necessary for installation.
6. Place permanent stream crossing structures in fishery streams before heavy equipment moves beyond the crossing area. Where this is not feasible, install temporary crossings to minimize stream disturbance.
7. Place rip-rap on fills around culvert inlets and outlets.

### 3. Temporary Stream Crossing Construction

- Practices:**
1. Where possible, limit the installation and removal of temporary crossing structures to only one time during the same year and within the prescribed work period. Installation and removal should occur between the low flow period (generally June 15 to September 15).
  2. Use backfill material that is as soil-free as practicable over temporary culverts. Whenever possible use washed river rock covered by pit run or one inch minus as a compacted running surface.
  3. Spread and reshape clean fill material to the original lines of the streambed after a crossing is removed to ensure the stream remains in its channel during high flow.
  4. Use log cribbing in tractor logging units when it is impractical to use a culvert and rock backfill material. Remove upon completion of logging the unit.
  5. Limit activities of mechanized equipment in the stream channel to the area that is necessary for installation and removal operations.
  6. Remove stream crossing drainage structures and in-channel fill material during low flow and prior to fall rains. Reestablish natural drainage configuration.

### 4. Low Water Ford Stream Crossing Construction

- Practices:**
1. Restrict construction and use to low flow period (generally June 15 to September 15).
  2. Use washed rock/gravel or concrete slab in the crossing.
  3. Apply rock on road approaches within 150 feet of each side of the ford to prevent washing and softening of the road surface.

## E. Landings

**Objective:** To minimize soil disturbance, soil erosion, soil productivity losses, and water quality degradation.

- Practices:**
1. Locate landings at approved sites.
  2. Avoid placing landings adjacent to or in meadows or other wetland areas.
  3. Clear or excavate landings to minimum size needed for safe and efficient operations.

4. Select landing locations considering the least amount of excavation, erosion potential, and where sidecast will not enter drainages or damage other sensitive areas.
5. Deposit excess excavated material on stable sites where there is no erosion potential. Construct waste disposal sites according to guidelines in VII.D.1.
6. Restore landings to the natural configuration or shape to direct the runoff to preselected spots where water can be dispersed to natural, well-vegetated, gentle ground.

## F. Road Erosion Control

**Objective:** To limit and mitigate soil erosion and sedimentation.

- Practices:**
1. Apply protective measures to all areas of disturbed, erosion-prone, unprotected ground, including waste disposal sites, prior to fall rains. Protective measures may include water bars, water dips, grass seeding, planting deep rooted vegetation, and/or mulching. Armor or buttress fill slopes and unstable areas with rock which meets construction specifications. See section VIII.C.1. for water bar (water dip) spacing and construction guidelines.
  2. Use seasonal restrictions on unsurfaced roads.

## G. Road Renovation/Improvement

**Objective:** To restore or improve a road to a desired standard in a manner that minimizes sediment production and water quality degradation.

- Practices:**
1. Improve flat gradients to a minimum of two (2) percent or provide raised subgrade sections (turnpike) to avoid saturation of the road prism.
  2. Reconstruct culvert catchbasins to specifications. Catchbasins in solid rock need not be reconstructed provided water flow is not restricted by soil, rock, or other debris.
  3. Identify potential water problems caused by off-site disturbance and add necessary drainage facilities.
  4. Identify ditchline and outlet erosion caused by excessive flows and add necessary drainage facilities and armoring.
  5. Replace undersized culverts and repair damaged culverts and downspouts.
  6. Add additional full-rounds, half-rounds, and energy dissipators as needed.
  7. Correct special drainage problems (e.g., high water table, seeps) that effect stability of subgrade through the use of perforated drains, geotextiles, or drainage bays.
  8. Eliminate undesirable berms that retard normal surface runoff.
  9. Restore outslope or crown sections.
  10. Avoid disturbing backslope while reconstructing ditches.
  11. Surface inadequately surfaced roads that are to be left open to traffic during wet weather.
  12. Require roadside brushing be done in a manner that prevents disturbance to root systems (i.e., avoid using excavators for brushing).

## H. Road Maintenance

**Objective:** To maintain roads in a manner that protects water quality and minimizes erosion and sedimentation.

- Practices:**
1. Provide basic custodial care to protect the road investment and to ensure minimal damage to adjacent land and resources.
  2. Perform blading and shaping to conserve existing surface material, retain the original crowned or outslotted self-draining cross section, prevent or remove rutting berms (except those designed for slope protection) and other irregularities that retard normal surface runoff. Avoid wasting loose ditch or surface material over the shoulder where it can cause stream sedimentation or weaken slump prone areas. Avoid undercutting backslopes.
  3. Keep road inlet and outlet ditches, catchbasins, and culverts free of obstructions, particularly before and during winter rainfall. However, keep routine machine cleaning of ditches to a minimum during wet weather.
  4. Promptly remove slide material when it is obstructing road surface and ditchline drainage. Save all soil or material useable for quarry reclamation and stockpile for future reclamation projects. Utilize remaining slide material for needed road improvement or place in a stable waste area. Avoid sidecasting of slide material where it can damage, overload, saturate embankments, or flow into downslope drainage courses. Reestablish vegetation in areas where more than 50 percent of vegetation has been destroyed due to sidecasting.
  5. Retain vegetation on cut slopes unless it poses a safety hazard or restricts maintenance activities. Cut roadside vegetation rather than pulling it out and disturbing the soil.
  6. Remove snow on haul roads in a manner that will protect roads and adjacent resources. Remove or place snow berms to prevent water concentration on the roadway or on erodible sideslopes or soils.
  7. Patrol areas subject to road or watershed damage during periods of high runoff.

## I. Dust Abatement

**Objective:** To minimize movement of fine sediment from roads; to prevent introduction into waterways of chemicals applied for dust abatement.

- Practice:**
1. Use dust palliatives or surface stabilizers to reduce surfacing material loss and buildup of fine sediment that may wash off into water courses.
  2. Closely control application of dust palliatives and surface stabilizers, equipment cleanup, and disposal of excess material to prevent contamination or damage to water resources.

## J. Road Access Restrictions

**Objective:** To reduce road surface damage and therefore minimize erosion and sedimentation.

- Practices:**
1. Barricade or block roads using gates, guard rails, earth/log barricades, boulders, logging debris, or a combination of these methods. Avoid blocking roads that will need future maintenance (i.e., culvert cleaning, slide removal, etc.) with unremovable barricades. Use guardrails, gates, or other barricades capable of being opened for roads needing future maintenance.

## *Appendix F - Best Management Practices*

2. Provide maintenance of blocked roads in accordance with design criteria.
3. Install waterbars, cross drains, cross sloping, or drainage dips if not already on road to assure drainage.
4. Scarify, mulch, and/or seed for erosion control.

## **K. Road and Landing Decommissioning**

**Objective:** To reduce soil compaction, minimize or reduce sedimentation, and improve site productivity by decommissioning roads and landings and rehabilitating the land.

- Practices:**
1. Rip temporary spur roads and landings by an approved method to remove ruts, berms, and ditches while leaving or replacing surface cross drain structures.
  2. Return roads or landings not needed for future resource management to resource production by revegetating with native species. Apply mulch and fertilizer where appropriate.

## **L. Water Source Development**

**Objective:** To supply water for various resource programs while protecting water quality and riparian vegetation.

- Practices:**
1. Design and construct durable, long-term water sources.
  2. Avoid reduction of downstream flow which would detrimentally effect aquatic resources, fish passage, or other uses.
  3. Direct overflow from water-holding developments back into the stream.
  4. Locate road approaches to instream water source developments to minimize potential impacts in the riparian zone. Apply rock to surface of these approaches to reduce the effects of sediment washing into the stream.
  5. Avoid use of road fills for water impoundment dams unless specifically designed for that purpose. Remove any blocking device prior to fall rains.
  6. Construct water sources during the dry season (generally between May 15 and October 15).

## **M. Rock Quarry Reclamation**

**Objective:** To minimize sediment production from quarries and associated crusher pad developments susceptible to erosion due to steep sideslopes, lack of vegetation, or their proximity to water courses.

- Practices:**
1. Prior to excavation, remove topsoil and place at a site with minimal erosion potential. Stockpile topsoil for surface dressing during the post-operation rehabilitation.
  2. Use culverts and rip-rap for crusher pad drainage when necessary.
  3. Stabilize quarry cutbanks and general quarry area.
  4. Revegetate with native species, apply mulch, and provide adequate drainage to minimize erosion.

5. Rip, waterbar, block, fertilize, and revegetate access roads to quarries where no future entry is planned.

## VIII. Timber Harvest

### A. Yarding Methods

#### 1. Cable

**Objective:** To minimize soil damage and erosion caused by displacement or compaction.

- Practices:**
1. Use full or partial suspension when yarding on erodible or ravel prone areas where practical.
  2. Use full or partial suspension with seasonal restrictions on areas of high water tables.
  3. Use seasonal restriction if required suspension cannot be achieved by yarding equipment.
  4. Avoid downhill yarding.

#### 2. Tractor

**Objective:** To minimize loss of soil productivity and reduce potential for surface runoff and subsequent water quality degradation.

- Practices:**
1. In previously unentered stands, use designated skid roads to limit soil compaction to less than 12 percent of the harvest area.
  2. Minimize width of skid roads.
  3. For stands previously logged with tractors, utilize existing skid roads. Rip all skid roads used in final entry harvest.
  4. Rip skid roads discontinuously, preferably with winged ripper teeth when the soil is dry. Rips should be spaced no more than 36 inches apart and from 12 to 18 inches deep or to bedrock, whichever is shallower. Designated skid roads should be ripped if they will not be used again until the next rotation.
  5. Avoid placement of skid roads through areas with high water tables.
  6. Use appropriate seasonal restrictions that would result in no off-site damage for designated skid roads.
  7. Allow logging on snow when snow depth is 18 inches or greater and negligible ground surface exposure occurs during the operation.
  8. Restrict tractor operations to slopes less than 35 percent.
  9. Construct waterbars on skid roads according to guidelines in Section VIII.C.1.
- #### 3. Helicopter



**Objective:** To minimize surface disturbance on high risk watersheds.

**Practice:** 1. Employ helicopter yarding to avoid or minimize new road construction in high risk watersheds.

4. Horse

**Objective:** To minimize soil disturbance, soil compaction, and soil erosion.

**Practices:** 1. Limit horse logging to slopes less than 20 percent.

2. Construct hand waterbars on horse skid trails according to guidelines in Section VIII.C.1.

3. Limit harvest activity to times when soil moisture content at a six-inch depth is less than 25 percent by weight.

## B. Erosion Control for Timber Harvest

1. Waterbars

**Objective:** To minimize soil erosion.

**Practices:** 1. Construct adequate waterbars on skid roads, yarding corridors, and fire lines prior to fall rains.

2. Use the following table for waterbar spacing, based on gradient and erosion class.

**Water Bar Spacing by Gradient and Erosion Class**

Gradient(%)	Water Bar Spacing (feet) <sup>1</sup>		
	Erosion Class <sup>2</sup>		
	High	Moderate	Low <sup>3</sup>
2-5	200	300	400
6-10	150	200	300
11-15	100	150	200
16-20	75	100	150
21-35	50	75	100
36+	50	50	50

<sup>1</sup>Spacing is determined by slope distance and is the maximum allowed for the grade.

<sup>2</sup>The following guide lists rock types according to erosion class:

High: granite, sandstone, andesite porphyry, glacial or alluvial deposits, soft matrix conglomerate, volcanic ash, pyroclastics;  
 Moderate: basalt, andesite, quartzite, hard matrix conglomerate, rhyolite;  
 Low: metasediments, metavolcanics, hard shale.

3. Use the following techniques to construct waterbars:

a. Open the downslope end of the waterbar to allow free passage of water.

b. Construct the waterbar so that it will not deposit water where it will cause erosion.

c. Compact the waterbar berm to prevent water from breaching the berm.

d. Skew waterbars no more than 30 degrees from perpendicular to the centerline of the trail or road.



## 2. Revegetation of Disturbed Areas

**Objective:** To establish an adequate vegetative cover on disturbed sites to prevent erosion.

**Practice:** 1. Use native vegetation that allows natural succession to occur. Avoid interference with reforestation operations. Include application of seed, mulch, and fertilizer as necessary. Complete prior to fall rains.

# IX. Silviculture

## A. Site Preparation

### 1. Gross Yarding

**Objective:** To achieve cool burn on sensitive soils and maintain protective duff layer.

**Practice:** 1. Consider the following in writing a prescription for gross yarding to reduce burn intensities: long-term site productivity, ecosystem dynamics, regeneration success, prescribed fire intensities, and smoke emissions.

### 2. Prescribed Fire - Underburn and Concentration Burn

#### a. General Guidelines

**Objective:** To maintain long-term site productivity of soil.

**Practice:** 1. Evaluate need for burning based on soils, plant community, and site preparation criteria. Burn under conditions when a light burn can be achieved (see guidelines below) to protect soil productivity.

Category 1 Soils (highly sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment snags as specified in the Standards and Guidelines on p. C-40 in the SEIS ROD.

Category 2 Soils (moderately sensitive): burn only in spring-like conditions when soil and duff are moist. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment snags as specified in the Standards and Guidelines on p. C-40 in the SEIS ROD. Write fire prescriptions that reduce disturbance and duration and achieve low fire intensity.

Category 3 Soils (least sensitive): burn to avoid high intensity (severe) burns to protect a large percentage of the nutrient capital. Maximize retention of duff layer. Assure retention of minimum levels of coarse woody debris and recruitment snags as specified in the Standards and Guidelines on p. C-40 in the SEIS ROD.

## Guidelines for Levels of Prescribed Burn Intensity

Visual Characterization	Site-Specific Results	Proportional Area
Light burn	The surface duff layer is often charred by fire but not removed. Duff, crumbled wood or other woody debris is partly burned, logs not deeply charred.	Less than 2 percent is severely burned. Less than 15 percent is moderately burned.
Moderate burn	Duff, rotten wood, or other woody debris partially consumed; logs may be deeply charred but mineral soil under the ash not appreciably changed in color.	Less than 10 percent is severely burned. More than 15 percent is moderately burned.
Severe burn	Top layer of mineral soil significantly changed in color, usually to reddish color; next 1/2 inch blackened from organic matter charring by heat conducted through top layer.	More than 10 percent is severely burned. More than 80 percent is moderately burned. Remainder is lightly burned.

## b. Firelines

**Objective:** To minimize soil disturbance, soil compaction, soil erosion, and disturbance to Riparian Reserves.

- Practices:**
1. Construct firelines by hand on all slopes greater than 35 percent.
  2. Utilize one-pass construction with a brush blade for tractor firelines.
  3. Construct waterbars on tractor and hand firelines according to guidelines in Section VIII.C.1.
  4. No machine constructed firelines in Riparian Reserves.

## 3. Prescribed Fire - Piling

## a. Hand Piling

**Objective:** To prevent soil damage due to high burn intensity.

- Practices:**
1. Burn piles when soil and duff moisture are high.

## b. Tractor Piling

**Objective:** To protect soil productivity and to prevent soil damage due to compaction, displacement, and high burn intensity.

- Practices:**
1. Restrict tractor operations to dry conditions with less than 25 percent soil moisture content in the upper six inches of soil.
  2. Restrict tractors to slopes less than 20 percent.
  3. Construct small diameter piles or pile in windrows using brush blades.
  4. Avoid piling concentrations of large logs and stumps.
  5. Pile small material (3 to 8 inches diameter size).
  6. Burn piles when soil and duff moisture are high.
  7. Rip entire area to maintain soil productivity except that occupied by piles. Use winged ripper teeth and rip on contour to minimum depth of 12 inches. No ripping on clayey soils (i.e., soil series 706, 708, 840, 850).
  8. Avoid displacement of duff and topsoil into piles or windrows.
  9. Make only two machine passes (one round trip) over the same area wherever practical.
  10. Use the lowest ground pressure machine capable of meeting objectives.

## B. Fertilization

**Objective:** To protect water quality and to avoid impacts that retard or prevent attainment of the Aquatic Conservation Strategy objectives.

- Practices:**
1. Avoid aerial application when wind speeds would cause drift.
  2. Locate heliports and storage areas away from Riparian Reserves.
  3. No application within Riparian Reserves.
  4. Avoid direct application to ephemeral stream channels.

# X. Special Forest Products

## A. Roads

**Objective:** To prevent erosion and water quality degradation.

- Practices:**
1. Utilize seasonal restriction on harvesting if access is by an unsurfaced road.
  2. Clean all road surfaces, ditches, and catchbasins of debris from harvesting.

## B. Harvest

### 1. Yarding Methods

**Objective:** To minimize soil damage and soil erosion.

- Practice:**
1. Follow practices listed in Section VIII.B.

## XI. Mineral Development

**Objective:** To protect surface and groundwater quality and to minimize disturbance to streambanks and riparian habitat within constraints of Department of Interior, Bureau of Land Management surface mining regulations.

### A. Locatable Operations

- Practices:**
1. Require the claimant to obtain all required state and federal operating permits.
  2. Comply with seasonal restrictions on suction dredging identified in Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources.
  3. Locate, design, operate, and maintain sediment settling ponds in conformance with state Department of Environmental Quality (DEQ) requirements.
  4. Design, locate, and construct stream crossings in conformance with practices described in Sections VII.C. and VII.D.
  5. Use existing roads, skid trails, and stream crossings whenever possible.
  6. Apply rock to roads constructed or reconstructed for vehicular access to the mining area. Provide roads with adequate drainage.
  7. Prior to the first wet season, rip, waterbar, seed, mulch, and barricade according to BLM specifications all roads and trails constructed for exploratory purposes that are unnecessary for the mining operation.
  8. Construct waterbars and barricade on all natural surface roads and trails when an operation shuts down for the wet season. See section VIII.C.1 for guidelines on waterbar spacing and construction.
  9. Rip, waterbar, seed, mulch, and barricade all natural surface roads and trails when the operation terminates.
  10. Construct a berm or trench between disturbed areas and water courses.
  11. Stockpile topsoil for use during reclamation of the site. Construct a berm or trench immediately downslope of the stockpile.
  12. Stabilize and contour the area, replace topsoil and mulch, seed, and plant the area with tree seedlings when no further mining is contemplated.
  13. During the period from October 15 to May 15, contour and mulch disturbed areas that will not be mined for at least 30 days.
  14. Confine operations to bench areas rather than allow encroachment on the stream whenever possible.
  15. Locate and maintain sanitation facilities in accordance with state DEQ regulations.

## **B. Saleable Operations**

- Practices:**
1. Locate stockpile sites on stable ground where the material would not move into streams or water bodies.
  2. Locate, design, construct, and close roads, landings, and crusher pads in accordance with section VII.

## **XII. Livestock Grazing**

**Objective:** To protect, maintain, or improve water quality, riparian-wetland areas and upland plant communities; to achieve properly functioning riparian ecosystems.

- Practices:**
1. Consider fencing springs, seeps, and water developments to protect water quality and riparian ecosystems.
  2. Ensure rest for plant growth and vigor during the critical growing period.
  3. Monitor, evaluate, and adjust livestock management practices to meet resource objectives.
  4. Resolve management conflicts through the development of grazing management plans.
  5. Promote ecological recovery through appropriate forage utilization levels.
  6. Develop and implement recovery plans for riparian areas.

## **XIII. Wildfire**

### **A. Prevention**

**Objective:** To minimize occurrence of severe intensity wildfires in Riparian Reserves, on category 1 soils, and high risk watersheds.

- Practice:**
1. Utilize prescribed burning to reduce both natural and management related slash (fuel) adjacent and/or within these areas.

### **B. Suppression**

**Objective:** To minimize water quality degradation while achieving rapid and safe suppression of a wildfire.

- Practices:**
1. Apply the appropriate level of wildfire suppression which considers impacts of the wildfire as well as the suppression action.
  2. Construct firelines by hand within Riparian Reserves.
  3. Apply aerial retardant adjacent to Riparian Reserves by making passes parallel to Riparian Reserves.

## C. Rehabilitation

**Objective:** To protect water quality and soil productivity with consideration for other resources.

- Practices:**
1. Utilize vegetation classification information as the framework for prescribing rehabilitation activities.
  2. Develop a fire rehabilitation plan through an interdisciplinary process.
  3. Select treatments on the basis of on-site values, downstream values, probability of successful implementation, social and environmental considerations (including protection of native plant community), and cost as compared to benefits.
  4. Erosion control seeding should attempt to meet the intent of ecosystem based management objectives. Use seed availability information to prioritize erosion control seeding. First priority should be native seed sources for grasses and forbs, followed by annual grasses and forbs, and the lowest priority should be the use of perennial grasses.
  5. Examples of emergency fire rehabilitation treatments include:
    - a. Seeding or planting native species or other nitrogen fixing vegetation that accomplishes necessary erosion control and meets site restoration objectives.
    - b. Mulch with straw or other suitable material.
    - c. Fertilize.
    - d. Place channel stabilization structures.
    - e. Place trash racks above road drainage structures.
    - f. Construct waterbars on firelines.

## XIV. Watershed Restoration

Watershed restoration is a key component of the Aquatic Conservation Strategy and is based on watershed analysis (see the Standards and Guidelines on p. B-30 and p. C-37 in the SEIS ROD).

### A. Roads

See sections VII.F., VII.G., and VII.K.

### B. Riparian Vegetation

See the Standards and Guidelines p. B-31 and p. C-32 in the SEIS ROD.

## C. In-Stream Habitat Structures

**Objective:** To minimize damage to streambanks and riparian habitat during construction of in-stream habitat improvement projects.

- Practices:**
1. Carefully plan access needs for individual work sites within a project area to minimize exposure of bare soil, compaction, and possible damage to tree roots. Utilize existing trails to the extent practical.
  2. Base design of habitat improvement structures on state-of-the-art techniques and local stream hydraulics.
  3. Confine work in the stream channels to between June 15 and September 15 to minimize the area of the stream that would be affected by sedimentation during the low flow period.
  4. Keep equipment out of streams to extent possible.
  5. Limit the amount of streambank excavation to the minimum necessary to ensure stability of enhancement structures. Place excavated material as far above the high water mark as possible to avoid entry into the stream.
  6. Whenever possible obtain logs for habitat improvement structures from outside the Riparian Reserve or at least 200 feet from the stream channel to maintain integrity of riparian habitat and streambanks.
  7. Inspect all mechanized equipment daily to help ensure toxic materials such as fuel and hydraulic fluid do not enter the stream.
  8. Utilize waterbars, barricades, and seeding to stabilize bare soil areas.

## D. Uplands

**Objective:** To increase soil stability, reduce soil erosion, and improve hydrologic functions.

- Practices:**
1. Use corrective measures to repair degraded watershed conditions and rehabilitate with an ecologically appropriate vegetative cover that will maintain or improve soil stability, reduce surface runoff, increase infiltration, and reduce flood occurrence and flood damages.

Table 1-A. Guide for Placing Common Soil and Geologic Types into Soil Erosion and Soil Infiltration Classes to Space Lateral Road Drainage Culverts

Representative Medford District Soil Series Type	721	729	380	719	706	718	381			
Erosion Class	I	II	III	IV	V	VI	VII	VIII	IX	X
Erosion Index	10	20	30	40	50	60	70	80	90	100
Standard Soil Textures and Unified System Soil Groups	SM	SM	Silt (unconsolidated) (B)	Silt (consolidated) (B)	Silty clay loam (A)	Clay loam (A)	Loamy sand (C)	Coarse sand (C)	Fine gravel (C)	Rock (C)
	ML	ML	OL	OL	Silty Clay (A)	Silt loam (A, B)	Sandy loam (B)	SW	SW	Cobble (C)
			MH	MH	Clay, varying with type, cohesiveness and compaction (A)	Clay, varying with type, cohesiveness and compaction (A)		SP	SP	Gravel (C)
				CL	Sandy clay (B)	Sandy clay loam (B)	Sand (B,C)	Sand (B,C)		GW,GP
					SC, GM OH, CH	CH, GM	GC			
Special Cases: General Names and Descriptions	Decomposed granodiorite (C)	Decomposed sandstone, c.g., (B,C)	Fine soils derived from rocks high in mica (C)	Coarse soils derived from rocks high in mica (C)	Some volcanic ash or extremely fine pumice sometimes difficult to distinguish from residual soils (B)	Some volcanic ash or extremely fine pumice sometimes difficult to distinguish from residual soils (B)				Fractured loose basalt or shale (C)
								"Shot" as found in (B,C)	"Shot-loam"	
	Highly decomposed granite (B)	Greasy decomposed rock high in clay (A)								Coarse volcanic cinders (C)
		Pumice, varying w/location, particle size, density, topography, and compaction (B,C)	Pumice, varying w/location, particle size, density, topography, and compaction (B,C)	Pumice, varying w/location, particle size, density, topography, and compaction (B,C)						Bed rock (A)

Erosion classes rate the soil textures and geologic types listed as if they contained 100 percent of the material specified. To place a soil mixture in the proper erosion class, multiply the estimated percent content of the various "Components" (rock, cobble, gravel, etc., and a given soil texture) by their respective erosion indices and add the results. The total indicates the erosion class of the mixture (see text for examples). Capital letters following a soil texture or geologic type indicate the infiltration class of the material as follows: (A) Indicates nonporous materials; (B) indicates moderately porous materials; (C) indicates highly porous materials. Representative Medford District soil series are indexed to erosion class based on subsoil and substratum description as most road construction occurs at these depths.



Table 2-A. Guide for Maximum Spacing (in feet) of Lateral Drainage Culverts by Soil Erosion Classes and Road Grade (2 percent - 18 percent)

Road Grade in Percent	Erosion Class	I	II	III	IV	V	VI	VII	VIII	IX	X
	Erosion Index	10	20	30	40	50	60	70	80	90	100
2		900	1225								
3		600	815	1070	1205						
4		450	610	800	905	1015					
5		360	490	640	725	810	865	1000			
6		300	410	555	605	675	720	835	1010		
7		255	350	455	515	580	620	715	865	1030	1210
8		225	305	400	450	505	540	625	755	900	1055
9		200	270	355	400	450	480	555	670	800	940
10		180	245	320	360	405	435	500	605	720	845
11		165	220	290	330	370	395	455	550	655	770
12		150	205	265	305	340	360	415	505	600	705
13		140	190	245	280	310	335	385	465	555	650
14		130	175	230	260	290	310	355	430	515	605
15		120	165	215	240	270	300	335	405	480	565
16		115	155	200	225	255	280	310	380	450	530
17		105	145	190	215	240	265	295	355	424	500
18		100	135	180	200	225	250	280	335	400	470
19-40	Jeep Roads Skid Roads	50	50	50	90	90	90	90	90	90	90

This table is based on rainfall intensities of 1 to 2 inches per hour falling in a 15-minute period with an expected recurrence interval of 25 years. For areas having intensities other than 1 to 2 inches per hour, divide values in the table as follows:

Rainfall Intensity	Divisor
2-3 inches per hour	1.50
3-4 inches per hour	1.75
4-5 inches per hour	2.00
Less than 1 inch per hour	Whatever the intensity (.75, .85, etc.)

Ref: Transportation Engineering Handbook, U.S. Forest Service, R-6, 1966.

Notes: In soils producing high sediment yields such as the 721, 729, and 300 series, the spacings shown should be considered as maximum distances between drainage structures. 300 feet to 400 feet on gradients of 4 to 10 percent in these soils was found to be the average spacing that provided fair ditchline protection.



# Appendix G

## Special Status Species, Species to be Protected Through Survey and Manage Guidelines, and Protection Buffer Species

### Introduction

Appendix G includes three tables: G-1. Special Status Plant and Animal Species for the Medford District, G-2. SEIS Species to be Protected through Survey and Management Guidelines, and G-3. SEIS Species to be Protected Through Protection Buffers.

G-1. Special Status Plant and Animal Species are species that consist of officially listed, proposed for listing, or are candidates for listing by the U.S. Fish and Wildlife Service. This list also includes species that the BLM considers sensitive and manages to prevent them from becoming federal candidates. These are managed by Bureau policy.

G-2. SEIS Species to be Protected Through Survey and Management Guidelines are species that are

identified in Table 3-C of the SEIS ROD. The standard and guideline contains four components, and priorities differ among them. They are to manage known sites, to survey prior to ground-disturbing activities, to conduct extensive surveys, or to conduct general regional surveys. This list is all inclusive for the range of the SEIS. The Medford District has no specific data on these species with the exception of the salamanders and the vascular plants.

G-3. SEIS Species to be Protected Through Protection Buffers are additional standards and guidelines from the Scientific Analysis Team Report for specific rare and locally endemic species, and other specific species in the upland forest Matrix (ROD). When located, the occupied sites need to be protected with buffers as identified in the ROD.

### Appendix G-1. Special Status Species<sup>1</sup> Medford District

Scientific Name	Common Name	Status <sup>2</sup>
<b>Vascular Plants</b>		
<i>Adiantum jordanii</i>	California maiden-hair <sup>3</sup>	BT
<i>Agrostis micropylla</i> var. <i>hendersonii</i>	Henderson's bentgrass	FC
<i>Allium bolanderi</i> var. <i>bolanderi</i>	Typical Bolander's onion <sup>3</sup>	BT
<i>Allium bolanderi</i> var. <i>mirabile</i>	Potato bulb Bolander's onion <sup>3</sup>	BT
<i>Allium campanulatum</i>	Sierra onion	BT
<i>Allium peninsulare</i>	Peninsular onion	BT
<i>Allium sanbornii</i> var. <i>sanbornii</i>	Sanborn's onion	BT
<i>Ammannia robusta</i>	Ammannia	BT
<i>Androsace elongata</i> ssp. <i>acuta</i>	Long-stemmed androsace	BA
<i>Arabis aculeolata</i>	Waldo rockcress <sup>3</sup>	BT
<i>Arabis koehleri</i> var. <i>stipitata</i>	Koehler's stipitate rockcress <sup>3</sup>	BT
<i>Arabis modesta</i>	Rogue Canyon rockcress <sup>3</sup>	BA
<i>Arabis serpentinicola</i>	Preston Peak rockcress	FC
<i>Arabis</i> sp. <i>nov./ined.</i>	Del Norte rockcress	FC
<i>Arctostaphylos hispidula</i>	Hairy manzanita <sup>3</sup>	BA
<i>Asarum wagneri</i>	Green-flowered ginger <sup>3</sup>	BS
<i>Asplenium septentrionale</i>	Northern spleenwort	BA
<i>Aster brickelliioides</i>	Smooth rayless aster	BT

Special Status Species<sup>1</sup> Medford District

Scientific Name	Common Name	Status <sup>2</sup>
<i>Astragalus accidens</i> var. <i>hendersonii</i>	Thicket milk-vetch <sup>3</sup>	BA
<i>Astragalus californicus</i>	California milk-vetch	BT
<i>Astragalus gambelianus</i>	Gambel milk-vetch	BT
<i>Astragalus umbraticus</i>	Woodland milk-vetch <sup>3</sup>	BA
<i>Balsamorhiza sericea</i>	Silky balsamroot <sup>3</sup>	BT
<i>Bensoniella oregana</i>	Bensonia <sup>3</sup>	FC/SEIS
<i>Botrychium crenulatum</i>	Crenulate moonwort	FC
<i>Brodiaea californica</i>	California brodiaea	BT
<i>Callitriche marginata</i>	Winged water-starwort	BT
<i>Calochortus coxii</i>	Cox's mariposa lily	FC
<i>Calochortus greenei</i>	Greene's mariposa lily <sup>3</sup>	FC
<i>Calochortus howellii</i>	Howell's mariposa lily <sup>3</sup>	FC
<i>Calochortus indecorus</i>	Sexton Mt. mariposa lily	FC
<i>Calochortus monophyllum</i>	Yellow star-tulip <sup>3</sup>	BA
<i>Calochortus umpquaensis</i>	Umpqua mariposa lily <sup>3</sup>	FC/SEIS
<i>Camassia howellii</i>	Howell's camas <sup>3</sup>	FC
<i>Camissonia graciliflora</i>	Slender-flowered evening-primrose	BT
<i>Camissonia ovata</i>	Golden eggs	BT
<i>Cardamine gemmata</i>	Purple toothwort <sup>3</sup>	FC
<i>Cardamine nuttallii</i> var. <i>covilleana</i>	Coville's toothwort	BT
<i>Carex buxbaumii</i>	Buxbaum's sedge	BT
<i>Carex gigas</i>	Siskiyou sedge <sup>3</sup>	BA
<i>Carex livida</i>	Pale sedge	BA
<i>Carex saliniformis</i>	Deceiving sedge	BT
<i>Carex serratodens</i>	Saw-tooth sedge	BT
<i>Castilleja hispida</i> ssp. <i>brevilobata</i>	Short-lobed red paintbrush <sup>3</sup>	BT
<i>Cheilanthes intertexta</i>	Coastal liffern	BA
<i>Chlorogalum angustifolium</i>	Narrow-leaved amole	BA
<i>Cimicifuga elata</i>	Tall bugbane <sup>3</sup>	FC
<i>Cryptantha milobakeri</i>	Milo Baker's cryptantha	BT
<i>Cupressus bakeri</i>	Baker's cypress <sup>3</sup>	BA
<i>Cypripedium californicum</i>	California lady's-slipper	BT
<i>Cypripedium fasciculatum</i>	Clustered lady's-slipper <sup>3</sup>	FC/SEIS
<i>Cypripedium montanum</i>	Mountain lady's-slipper <sup>3</sup>	BT/SEIS
<i>Darlingtonia californica</i>	California pitcher-plant <sup>3</sup>	BT
<i>Delphinium nudicaule</i>	Red larkspur <sup>3</sup>	BT
<i>Dicentra formosa</i> ssp. <i>oregana</i>	Oregon bleedingheart <sup>3</sup>	BT
<i>Dicentra pauciflora</i>	Few-flowered bleedingheart	BA
<i>Dichelostemma ida-maia</i>	Firecracker flower <sup>3</sup>	BT
<i>Draba howellii</i>	Howell's whitlow-grass	BA
<i>Epilobium oreganum</i>	Oregon willow herb <sup>3</sup>	FC
<i>Epilobium rigidum</i>	Rigid willow herb <sup>3</sup>	BT
<i>Erigeron cervinus</i>	Deer erigeron	BA
<i>Eriogonum pendulum</i>	Nodding buckwheat <sup>3</sup>	BT
<i>Eriogonum ternatum</i>	Waldo buckwheat <sup>3</sup>	BT
<i>Erythronium howellii</i>	Howell's adder's-tongue <sup>3</sup>	BA
<i>Eschscholzia caespitosa</i>	Gold poppy <sup>3</sup>	BA
<i>Euonymus occidentalis</i>	Western wahoo	BT
<i>Frasera umpquaensis</i>	Umpqua swertia <sup>3</sup>	FC
<i>Fritillaria falcata</i>	Falcate fritillary	FC
<i>Fritillaria gentneri</i>	Gentner's fritillary <sup>3</sup>	FC

Special Status Species<sup>1</sup> Medford District

Scientific Name	Common Name	Status <sup>2</sup>
<i>Fritillaria glauca</i>	Siskiyou fritillary <sup>3</sup>	BA
<i>Fritillaria purdyi</i>	Purdy's fritillary	BA
<i>Gentiana plurisetosa</i>	Elegant gentian	FC
<i>Gentiana setigera</i>	Waldo gentian <sup>3</sup>	FC
<i>Haplopappus whitneyi</i> spp. <i>discoideus</i>	Whitney's haplopappus	BA
<i>Hastingsia atropurpurea</i>	Purple-flowered rush lily <sup>3</sup>	FC
<i>Hastingsia bracteosa</i>	Large-flowered rush lily <sup>3</sup>	FC
<i>Helianthus bolanderi</i>	Bolander's sunflower	BT
<i>Hesperervax acaulis</i> var. <i>robustior</i>	Robust evax	BT
<i>Hesperervax sparsiflora</i> var. <i>brevifolia</i>	Short-leaved evax	BT
<i>Hieracium bolanderi</i>	Bolander's hawkweed <sup>3</sup>	BA
<i>Hieracium greenii</i>	Greene's hawksweed	BT
<i>Horkelia tridentata</i> ssp. <i>tridentata</i>	Three-toothed horkelia	BT
<i>Howellia aquatilis</i>	Howellia	FP
<i>Iliamna latibracteata</i>	Globe mallow	BA
<i>Isopyrum stipitatum</i>	Dwarf isopyrum <sup>3</sup>	BT
<i>Juncus kelloggii</i>	Kellogg's dwarf rush	BT
<i>Kalmiopsis leachiana</i>	Kalmiopsis <sup>3</sup>	BT
<i>Keckiella lemmonii</i>	Bush beardtongue	BT
<i>Lathyrus delnorticus</i>	Del Norte pea	BT
<i>Leucothoe davisii</i>	Sierra laurel <sup>3</sup>	BT
<i>Lewisia cotyledon</i> var. <i>howellii</i>	Howell's lewisia <sup>3</sup>	FC
<i>Lewisia leana</i>	Many-flowered lewisia <sup>3</sup>	BA
<i>Lewisia oppositifolia</i>	Opposite-leaved lewisia <sup>3</sup>	BT
<i>Lilium pardalinum</i> ssp. <i>wigginsii</i>	Wiggin's lily <sup>3</sup>	BT
<i>Limnanthes floccosa</i> ssp. <i>bellingeriana</i>	Bellinger's meadow-foam <sup>3</sup>	FC
<i>Limnanthes floccosa</i> ssp. <i>pumila</i>	Dwarf meadow-foam <sup>3</sup>	FC
<i>Limnanthes gracilis</i> var. <i>gracilis</i>	Slender meadow-foam <sup>3</sup>	FC
<i>Linanthus bolanderi</i>	Bolander's linanthus	BT
<i>Lipocarpa aristulata</i>	Aristulate lipocarpa	BT
<i>Lithophragma campanulata</i>	Large-flowered hill star <sup>3</sup>	BT
<i>Lomatium cookii</i>	Cook's parsley <sup>3</sup>	FC/SEIS
<i>Lomatium engelmannii</i>	Engelmann's desert-parsley	BA
<i>Lomatium tracyi</i>	Tracy's desert-parsley	BA
<i>Lonicera interrupta</i>	Chaparral honeysuckle	BT
<i>Lotus stipularis</i> var. <i>stipularis</i>	Stipuled trefoil	BT
<i>Lupinus tracyi</i>	Tracy's lupine	BA
<i>Luzula subcongesta</i>	Donner wood-rush	BT
<i>Lycopodiella inundata</i>	Bog club-moss	BT
<i>Meconella oregana</i>	White meconella	FC
<i>Microseris douglasii</i> ssp. <i>douglasii</i>	Douglas' microseris	BA
<i>Microseris howellii</i>	Howell's microseris <sup>3</sup>	FC
<i>Microseris laciniata</i> ssp. <i>detlingii</i>	Detling's microseris <sup>3</sup>	FC
<i>Mimulus bolanderi</i>	Bolander's monkey-flower	BA
<i>Mimulus douglasii</i>	Douglas' monkeyflower <sup>3</sup>	BT
<i>Mimulus jepsonii</i>	Jepson's monkey-flower	BA
<i>Mimulus kelloggii</i>	Kellogg's monkey-flower <sup>3</sup>	BA
<i>Mimulus pulcherrae</i>	Candelabrum monkey-flower	BT
<i>Mimulus pygmaeus</i>	Pygmy monkey-flower <sup>3</sup>	FC
<i>Minuartia californica</i>	California sandwort <sup>3</sup>	BT
<i>Mirabilis greenii</i>	Siskiyou four-o'clock	BT

Special Status Species<sup>1</sup> Medford District

Scientific Name	Common Name	Status <sup>2</sup>
<i>Monardella purpurea</i>	Siskiyou monardella <sup>3</sup>	BA
<i>Montia diffusa</i>	Branching montia	BT
<i>Montia howellii</i>	Howell's montia	FC
<i>Myosorus minimus</i> ssp. <i>apus</i> var. <i>sessiliflorus</i>	Least mouse tail	FC
<i>Nama lobbii</i>	Lobb's nama <sup>3</sup>	BT
<i>Navarretia heterandra</i>	Tehama navarretia <sup>3</sup>	BA
<i>Navarretia tagetina</i>	Marigold navarretia	BT
<i>Nemacladus capillaris</i>	Common nemacladus <sup>3</sup>	BA
<i>Orthocarpus cuspidatus</i> ssp. <i>cuspidatus</i>	Broad-scaled owl-clover <sup>3</sup>	BT
<i>Oxypolis occidentalis</i>	Cow-bane	BT
<i>Perideridia erythrorhiza</i>	Red-root yampah <sup>3</sup>	FC
<i>Perideridia howellii</i>	Howell's false-caraway <sup>3</sup>	BA
<i>Phacelia leonis</i>	Leo's phacelia	BT
<i>Phacelia verna</i>	Spring phacelia <sup>3</sup>	BT
<i>Pilularia americana</i>	American pillwort	BA
<i>Pinus sabiniana</i>	Digger pine	BT
<i>Plagiobothrys austiniiae</i>	Austin's plagiobothrys	BT
<i>Plagiobothrys figuratus</i> ssp. <i>corallicarpus</i>	Coral-seeded allocarya <sup>3</sup>	FC
<i>Plagiobothrys glyptocarpus</i>	Sculptured allocarya	BT
<i>Poa piperi</i>	Piper's bluegrass <sup>3</sup>	BA
<i>Poa rhizomata</i>	Timber bluegrass	BT
<i>Poa suksdorfii</i>	Suksdorf's bluegrass	BT
<i>Potamogeton diversifolius</i>	Rafinesque's pondweed	BA
<i>Potamogeton foliosus</i> var. <i>fibrillosus</i>	Leafy pondweed	BA
<i>Ranunculus austro-oreganus</i>	Southern Oregon buttercup <sup>3</sup>	FC
<i>Rhamnus ilicifolia</i>	Red-berried buckthorn	BA
<i>Ribes divaricatum</i> var. <i>pubiflorum</i>	Straggly gooseberry	BT
<i>Romanzoffia "thompsonii,"</i> ssp. <i>ined.</i>	Thompson's romanzoffia	BS
<i>Rosa spithamea</i> var. <i>spithamea</i>	Ground rose	BT
<i>Salix delnortensis</i>	Del Norte willow <sup>3</sup>	BA
<i>Sanicula peckiana</i>	Peck's snake-root <sup>3</sup>	BT
<i>Scirpus pendulus</i>	Drooping bulrush	BT
<i>Scribneria bolanderi</i>	Scribner's grass	BA
<i>Sedum laxum</i> ssp. <i>heckneri</i>	Heckner's stonecrop <sup>3</sup>	BA
<i>Sedum moranii</i>	Rogue River stonecrop <sup>3</sup>	FC
<i>Sedum oblancoelatum</i>	Applegate stonecrop <sup>3</sup>	FC
<i>Sedum radiatum</i> ssp. <i>depauperatum</i>	Depauperate stonecrop <sup>3</sup>	FC
<i>Sedum spathulifolium</i> ssp. <i>purdyi</i>	Purdy's stonecrop	BA
<i>Sedum stenopetalum</i>		BT
<i>Senecio hesperius</i>	Siskiyou butterweed <sup>3</sup>	FC
<i>Silene californica</i>	California pink	BT
<i>Silene hookeri</i> ssp. <i>bolanderi</i>	Bolander's catchfly	BA
<i>Silene lemmonii</i>	Lemmon's campion <sup>3</sup>	BT
<i>Smilax californica</i>	California smilax <sup>3</sup>	BT
<i>Sophora leachiana</i>	Western sophora <sup>3</sup>	FC
<i>Streptanthus glandulosus</i>	Common jewel flower	BT
<i>Streptanthus howellii</i>	Howell's streptanthus <sup>3</sup>	BS
<i>Thlaspi montanum</i> var. <i>siskiyouense</i>	Siskiyou Mountain pennycress <sup>3</sup>	BT
<i>Trillium angustipetalum</i>	Siskiyou trillium	BA
<i>Triteleia crocea</i>	Yellow brodiaea	BT
<i>Triteleia ixioides</i> ssp. <i>anilina</i>	Sierra brodiaea <sup>3</sup>	BA

Special Status Species<sup>1</sup> Medford District

Scientific Name	Common Name	Status <sup>2</sup>
<i>Triteleia lxioides</i> ssp. <i>scabra</i>	Golden triteleia	BT
<i>Triteleia laxa</i>	Ithuriel's spear	BA
<i>Utricularia minor</i>	Lesser bladderwort	BA
<i>Vancouveria chrysantha</i>	Yellow vancouveria <sup>3</sup>	BT
<i>Veratrum insolitum</i>	Siskiyou false-hellebore <sup>3</sup>	BT
<i>Viola primulifolia</i> ssp. <i>occidentalis</i>	Western bog violet <sup>3</sup>	FC
<i>Wolffia columbiana</i>	Columbia wolffia	BA

## SEIS Vascular Plants

<i>Allotropa virgata</i>	Candystick <sup>3</sup>	SEIS
<i>Bensoniella oregana</i> (California)	Bensonia <sup>3</sup>	FC/SEIS
<i>Cypripedium fasciculatum</i>	Clustered lady's-slipper <sup>3</sup>	FC/SEIS
<i>Cypripedium montanum</i>	Mountain lady's-slipper <sup>3</sup>	BT/SEIS

## Non-Vascular Plants - Liverworts

<i>Barbilophozia arbata</i>	BT
<i>Barbilophozia lycopodioides</i>	BT
<i>Calypogeia sphagnicola</i>	BA
<i>Cephalozia spinigera</i>	BT
<i>Chiloscyphus gemmiparus</i>	BS
<i>Diplophyllum plicatum</i>	BT
<i>Haplomitrium hookeri</i>	BT
<i>Herbertus aduncus</i>	BT
<i>Herbertus sakuraii</i>	BA
<i>Jamesoniella autumnalis</i>	BT
<i>Lophozia laxa</i>	BA
<i>Marsupella sparsifolia</i>	BT
<i>Metzgeria temperata</i>	BT
<i>Plagiochila semidecurrens</i>	BT
<i>Radula brunnea</i>	BT
<i>Schofieldia monticola</i>	BT
<i>Sphaerocarpos hians</i>	BS
<i>Tritomaria quinquedentata</i>	BT

## Non-Vascular Plants - Mosses

<i>Andreaea schofieldian</i>	BA
<i>Bruchia bolanderi</i>	BT
<i>Campylopus schmidii</i>	BA
<i>Encalypta brevicolla</i> var. <i>crumiana</i>	BS
<i>Encalypta brevipes</i>	BT
<i>Funaria muhlenbergii</i>	BA
<i>Iwatsukiella leucotricha</i>	BA
<i>Limbella fryei</i>	FC
<i>Pohlia sphagnicola</i>	BA
<i>Polytrichum strictum</i>	BA
<i>Racomitrium pacificum</i>	BA
<i>Rhytidium rugosum</i>	BT
<i>Tayloria serrata</i>	BA

Special Status Species<sup>1</sup> Medford District

Scientific Name	Common Name	Status <sup>2</sup>
<i>Tetraplodon mnioides</i>		BA
<i>Trematodon boasii</i>		BT
<i>Tripterocladium leucocladulum</i>		BS
<i>Triquetrella californica</i>		BT
Non-Vascular Plants - Lichens		
<i>Bryoria bicolor</i>		BA
<i>Bryoria pseudocapillaris</i>		BA
<i>Buellia oidealea</i>		BT
<i>Caloplaca stantonii</i>		BA
<i>Cladidium bolanderi</i>		BT
<i>Erioderma sorediatum</i>		BA
<i>Hypogymnia duplicata</i>		BT
<i>Lecanora caesiurubella</i> ssp. <i>merrillii</i>		BT
<i>Lecanora pringlei</i>		BT
<i>Lecidea dolodes</i>		BT
<i>Lejoderma sorediatum</i>		BA
<i>Nephroma occultum</i>		BS
<i>Niebla cephalota</i>		BT
<i>Pseudocyphellaria aurata</i>		BT
<i>Pseudocyphellaria mougeotiana</i>		BA
<i>Schismatomma californicum</i>		BT
<i>Sulcaria badia</i>		BA
<i>Toleschistes flavicans</i>		BT
<i>Usnea hesperia</i>		BA
<i>Usnea rubicunda</i>		BT
Animals		
<i>Canis lupus</i>	Gray wolf	FE/SE
<i>Falco peregrinus</i>	Peregrine falcon	FE/SE
<i>Haliaeetus leucocephalus</i>	Bald eagle	FT/ST
<i>Strix occidentalis</i>	Northern spotted owl	FT/ST
<i>Brachyramphus marmoratus</i>	Marbled murrelet	FT/SC
<i>Oncorhynchus mykiss</i> ssp.	Redband trout	FC
<i>Catostomus rimiculus</i>	Jenny Creek sucker	FC
<i>Plethodon elongatus</i>	Del Norte salamander	FC/SV
<i>Plethodon stormi</i>	Siskiyou Mountains salamander	FC/SV
<i>Rana aurora</i>	Red-legged frog	FC
<i>Rana pretiosa</i>	Spotted Frog	FC/SC
<i>Clemmys marmorata</i>	Western pond turtle	FC/SC
<i>Accipiter gentilis</i>	Northern goshawk	FC/SC
<i>Lanius ludovicianus</i>	Loggerhead shrike	FC
<i>Oreortyx pictus</i>	Mountain quail	FC
<i>Plecotus townsendi</i>	Townsend's big eared bat	FC/SC
<i>Pisidium ultramontanum</i>	Oregon pearly mussel <sup>3</sup>	FC
<i>Monadenia fidelis</i> minor	Oregon snail <sup>3</sup>	FC
<i>Agapetus denningi</i>	Denning's agapetus caddisfly <sup>3</sup>	FC
<i>Farula davisii</i>	Green springs Mtn. farulan caddisfly	FC
<i>Homoplectra schuhi</i>	Schuh's homoplectran caddisfly <sup>3</sup>	FC



Special Status Species<sup>1</sup> Medford District

Scientific Name	Common Name	Status <sup>2</sup>
<i>Rhyacophila colonus</i>	O'Brien rhyacophilan caddisfly <sup>3</sup>	FC
<i>Tinodes siskiyou</i>	Siskiyou caddisfly	FC
<i>Rhyacophila fenderi</i>	Fender's rhyacophilan caddisfly <sup>3</sup>	FC
<i>Bombus franklini</i>	Franklin's bumblebee <sup>3</sup>	FC
<i>Chloeatis aspasma</i>	Siskiyou chloeatis grasshopper	FC
<i>Myotis thysanodes</i>	Fringed myotis <sup>3</sup>	BS/SV
<i>Rana cascadae</i>	Cascades frog <sup>3</sup>	AS/SC
<i>Aneides ferreus</i>	Clouded salamander <sup>3</sup>	AS/SC
<i>Aneides flavipunctatus</i>	Black salamander <sup>3</sup>	AS/SP
<i>Martes pennanti</i>	Fisher	AS/SC
<i>Asyndesmus lewis</i>	Lewis' woodpecker <sup>3</sup>	AS/SC
<i>Martes americana</i>	Marten <sup>3</sup>	AS/SC
<i>Ascaphus truei</i>	Tailed frog	AS/SV
<i>Sialia mexicana</i>	Western bluebird <sup>3</sup>	AS/SC
<i>Dryocopus pileatus</i>	Pileated woodpecker	AS/SC
<i>Picoides arcticus</i>	Black-backed woodpecker <sup>3</sup>	AS/SC
<i>Speotyto cunicularia</i>	Burrowing owl <sup>3</sup>	AS/SC
<i>Lampropeltis zonata</i>	California mountain kingsnake <sup>3</sup>	AS/SP
<i>Batrachoseps attenuatus</i>	California slender salamander <sup>3</sup>	AS/SP
<i>Lampropeltis getulus</i>	Common kingsnake <sup>3</sup>	AS/SP
<i>Otus flammeolus</i>	Flammulated owl <sup>3</sup>	AS/SC
<i>Strix nebulosa</i>	Great gray owl <sup>3</sup>	AS/SC
<i>Aegolius acadicus</i>	Northern saw-whet owl <sup>3</sup>	AS
<i>Antrozous pallidus</i>	Pacific pallid bat <sup>3</sup>	AS/SV
<i>Contia tenuis</i>	Sharptail snake <sup>3</sup>	AS/SC
<i>Dendrocopos albobarvatus</i>	White-headed woodpecker <sup>3</sup>	AS/SC
<i>Pelecanus erythrorhynchos</i>	White Pelican <sup>3</sup>	AS/SV
<i>Grus canadensis</i>	Greater sandhill crane <sup>3</sup>	AS/SV
<i>Picoides tridactylus</i>	Three-toed woodpecker <sup>3</sup>	AS/SC
<i>Progne subis</i>	Purple Martin <sup>3</sup>	AS/SC
<i>Sturnella neglecta</i>	Western meadowlark <sup>3</sup>	AS
<i>Oncorhynchus kisutch</i>	Coho salmon	AS/SC/SD/AFS
<i>Oncorhynchus mykiss</i>	Steelhead trout (winter) <sup>4</sup>	AFS/SD
<i>Oncorhynchus mykiss</i>	Steelhead trout (summer)	AFS/SD
<i>Oncorhynchus tshawytscha</i>	Chinook salmon (fall-run) <sup>4</sup>	AS/SD/SC/AFS

<sup>1</sup> Plants: As of September 1993; Animals: As of November 1991.<sup>2</sup> Federally listed by U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

FE: Federal endangered

FT: Federal threatened

FP: Federal proposed

FC: Federal candidate

State Listed:

SE: State endangered

ST: State threatened

SC: State candidate

Bureau-Sensitive:

BS: BLM sensitive

AS: Assessment species

AFS: American Fisheries Society

BS: Bureau Sensitive; ONHP List 1

BA: Bureau Assessment; ONHP List 2

BT: Bureau Tracking Species, ONHP lists 3 &amp; 4

State Sensitive:

SC: State Critical

SV: State Vulnerable

SP: State Peripheral

<sup>3</sup>Known to exist on BLM-administered land in the planning area.<sup>4</sup>Illinois River basin only.

# Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<b>Fungi</b>				
<b>Mycorrhizal Fungi</b>				
<b>Boletes</b>				
<i>Gastroboletus subalpinus</i>	X		X	
<i>Gastroboletus turbinatus</i>			X	
<b>Boletes, low elevation</b>				
<i>Boletus piperatus</i>			X	
<i>Tylopilus pseudoscaber</i>	X		X	
<b>Rare Boletes</b>				
<i>Boletus haematinus</i>	X		X	
<i>Boletus pulcherrimus</i>	X		X	
<i>Gastroboletus imbellus</i>	X		X	
<i>Gastroboletus ruber</i>	X		X	
<b>False Truffles</b>				
<i>Nivatogastrium nubigenum</i>	X		X	
<i>Rhizopogon abietis</i>			X	
<i>Rhizopogon atroviolaceus</i>			X	
<i>Rhizopogon truncatus</i>			X	
<i>Thaxterogaster pingue</i>			X	
<b>Uncommon False Truffle</b>				
<i>Macowanites chlorinosmus</i>	X		X	
<b>Rare False Truffles</b>				
<i>Alpova alexsmithii</i>	X		X	
<i>Alpova olivaceotinctus</i>	X		X	
<i>Arcangeliella crassa</i>	X		X	
<i>Arcangeliella lactarioides</i>	X		X	
<i>Destuntzia fusca</i>	X		X	
<i>Destuntzia rubra</i>	X		X	
<i>Gautieria magnicellaris</i>	X		X	
<i>Gautieria otthii</i>	X		X	
<i>Leucogaster citrinus</i>	X		X	
<i>Leucogaster microsporus</i>	X		X	
<i>Macowanites lymanensis</i>	X		X	
<i>Macowanites mollis</i>	X		X	
<i>Martellia fragrans</i>	X		X	
<i>Martellia idahoensis</i>	X		X	
<i>Martellia monticola</i>	X		X	

# Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<i>Octavianina macrospora</i>	X		X	
<i>Octavianina papyracea</i>	X		X	
<i>Rhizopogon brunneiniger</i>	X		X	
<i>Rhizopogon evadens</i> var. <i>subalpinus</i>	X		X	
<i>Rhizopogon exiguus</i>	X		X	
<i>Rhizopogon flavofibrillosus</i>	X		X	
<i>Rhizopogon inquinatus</i>	X		X	
<i>Sedecula pulvinata</i>	X		X	

## Undescribed Taxa, Rare Truffles and False Truffles

<i>Alpova</i> sp. nov. #Trappe 9730	X		X	
<i>Alpova</i> sp. nov. #Trappe 1966	X		X	
<i>Arcangeliella</i> sp. nov. #Trappe 12382	X		X	
<i>Arcangeliella</i> sp. nov. #Trappe 12359	X		X	
<i>Chamonixia pacifica</i> sp. nov. #Trappe 12768	X			
<i>Elaphomyces</i> sp. nov. #Trappe 1038	X		X	
<i>Gastroboletus</i> sp. nov. #Trappe 2897	X		X	
<i>Gastroboletus</i> sp. nov. #Trappe 7515	X		X	
<i>Gastrosuillus</i> sp. nov. #Trappe 7516	X		X	
<i>Gastrosuillus</i> sp. nov. #Trappe 9608	X		X	
<i>Gymnomyces</i> sp. nov. #Trappe 4703,5576	X		X	
<i>Gymnomyces</i> sp. nov. #Trappe 5052	X		X	
<i>Gymnomyces</i> sp. nov. #Trappe 1690,1706,1710	X			
<i>Gymnomyces</i> sp. nov. #Trappe 7545	X		X	
<i>Hydnотrya</i> sp. nov. #Trappe 787,792	X		X	
<i>Hydnотrya subnix</i> sp. nov. #Trappe 1861	X		X	
<i>Martellia</i> sp. nov. #Trappe 649	X		X	
<i>Martellia</i> sp. nov. #Trappe 1700	X		X	
<i>Martellia</i> sp. nov. #Trappe 311	X		X	
<i>Martellia</i> sp. nov. #Trappe 5903	X		X	
<i>Octavianina</i> sp. nov. #Trappe 7502	X		X	
<i>Rhizopogon</i> sp. nov. #Trappe 9432	X		X	
<i>Rhizopogon</i> sp. nov. #Trappe 1692	X		X	
<i>Rhizopogon</i> sp. nov. #Trappe 1698	X		X	
<i>Thaxterogaster</i> sp. nov. #Trappe 4867,6242,7427,7962,8520	X		X	
<i>Tuber</i> sp. nov. #Trappe 2302	X		X	
<i>Tuber</i> sp. nov. #Trappe 12493	X		X	

## Rare Truffles

<i>Balsamia nigra</i>	X		X	
<i>Choiromyces alveolatus</i>	X		X	
<i>Choiromyces venosus</i>	X		X	
<i>Elaphomyces anthracinus</i>	X		X	
<i>Elaphomyces subviscidus</i>	X		X	

# Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<b>Chanterelles</b>				
<i>Cantharellus cibarius</i>			X	X
<i>Cantharellus subalbidus</i>			X	X
<i>Cantharellus tubaeformis</i>			X	X
<b>Chanterelles - Gomphus</b>				
<i>Gomphus bonarii</i>			X	
<i>Gomphus clavatus</i>			X	
<i>Gomphus floccosus</i>			X	
<i>Gomphus kauffmanii</i>			X	
<b>Rare Chanterelle</b>				
<i>Cantharellus formosus</i>	X		X	
<i>Polyozellus multiplex</i>	X		X	
<b>Uncommon Coral Fungi</b>				
<i>Ramaria abietina</i>			X	
<i>Ramaria araiospora</i>	X		X	
<i>Ramaria botrytis</i> var. <i>aurantiiramosa</i>	X		X	
<i>Ramaria concolor</i> f. <i>tsugina</i>			X	
<i>Ramaria coulterae</i>			X	
<i>Ramaria fasciculata</i> var. <i>sparsiramosa</i>	X		X	
<i>Ramaria gelatiniaurantia</i>	X		X	
<i>Ramaria largentii</i>	X		X	
<i>Ramaria rubella</i> var. <i>blanda</i>	X		X	
<i>Ramaria rubrievanescens</i>	X		X	
<i>Ramaria rubripermanens</i>	X		X	
<i>Ramaria suecica</i>			X	
<i>Ramaria thiersii</i>	X		X	
<b>Rare Coral Fungi</b>				
<i>Ramaria amyloidea</i>	X		X	
<i>Ramaria aurantiiscescens</i>	X		X	
<i>Ramaria celerivirescens</i>	X		X	
<i>Ramaria claviramulata</i>	X		X	
<i>Ramaria concolor</i> f. <i>marri</i>	X		X	
<i>Ramaria cyaneigranosa</i>	X		X	
<i>Ramaria hilaris</i> var. <i>olympiana</i>	X		X	
<i>Ramaria lorithamnus</i>	X		X	
<i>Ramaria maculatipes</i>	X		X	
<i>Ramaria rainierensis</i>	X		X	
<i>Ramaria rubribrunnescens</i>	X		X	
<i>Ramaria stuntzii</i>	X		X	
<i>Ramaria verlotensis</i>	X		X	

# Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<i>Ramaria gracilis</i>	X		X	
<i>Ramaria spinulosa</i>	X		X	
<b>Phaeocollybia</b>				
<i>Phaeocollybia attenuata</i>			X	
<i>Phaeocollybia californica</i>	X		X	
<i>Phaeocollybia carmanahensis</i>	X		X	
<i>Phaeocollybia dissiliens</i>	X		X	
<i>Phaeocollybia fallax</i>			X	
<i>Phaeocollybia gregaria</i>	X		X	
<i>Phaeocollybia kauffmanii</i>	X		X	
<i>Phaeocollybia olivacea</i>			X	
<i>Phaeocollybia oregonensis</i>	X		X	
<i>Phaeocollybia piceae</i>	X		X	
<i>Phaeocollybia pseudofestiva</i>			X	
<i>Phaeocollybia scatesiae</i>	X		X	
<i>Phaeocollybia sipei</i>	X		X	
<i>Phaeocollybia spadicea</i>			X	
<b>Uncommon Gilled Mushrooms</b>				
<i>Catathelasma ventricosa</i>			X	
<i>Cortinarius azureus</i>			X	
<i>Cortinarius boulderensis</i>	X		X	
<i>Cortinarius cyanites</i>			X	
<i>Cortinarius magnivelatus</i>	X		X	
<i>Cortinarius olympianus</i>	X		X	
<i>Cortinarius spilomius</i>			X	
<i>Cortinarius tabularis</i>			X	
<i>Cortinarius valgius</i>			X	
<i>Dermocybe humboldtensis</i>	X		X	
<i>Hebeloma olympiana</i>	X		X	
<i>Hygrophorus caeruleus</i>	X	X		X
<i>Hygrophorus karstenii</i>			X	
<i>Hygrophorus vernalis</i>	X		X	
<i>Russula mustelina</i>			X	
<b>Rare Gilled Mushrooms</b>				
<i>Chroogomphus loculatus</i>	X		X	
<i>Cortinarius canabarb</i>	X		X	
<i>Cortinarius rainierensis</i>	X		X	
<i>Cortinarius variipes</i>	X		X	
<i>Cortinarius verrucisporus</i>	X		X	
<i>Cortinarius wiebeae</i>	X		X	
<i>Tricholoma venenatum</i>	X		X	

# Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<b>Uncommon Ecto-Polypores</b>				
<i>Albatrellus ellisii</i>			X	
<i>Albatrellus flettii</i>			X	
<b>Rare Ecto-Polypores</b>				
<i>Albatrellus avellaneus</i>	X		X	
<i>Albatrellus caeruleoporus</i>	X		X	
<b>Tooth Fungi</b>				
<i>Hydnum repandum</i>			X	
<i>Hydnum umbilicatum</i>			X	
<i>Phellodon atratum</i>			X	
<i>Sarcodon fuscoindicum</i>			X	
<i>Sarcodon imbricatus</i>			X	
<b>Rare Zygomycetes</b>				
<i>Endogone arcogena</i>	X		X	
<i>Endogone oregonensis</i>	X		X	
<i>Glomus radiatum</i>	X		X	
<b>Saprobies (Decomposers)</b>				
<b>Uncommon Gilled Mushrooms</b>				
<i>Baeospora myriadophylla</i>			X	
<i>Chrysomphalina grossula</i>			X	
<i>Collybia bakerensis</i>	X		X	
<i>Fayodia gracilipes (rainierensis)</i>			X	
<i>Gymnopilus punctifolius</i>	X		X	
<i>Marasmius applanatipes</i>	X		X	
<i>Mycena hudsoniana</i>	X		X	
<i>Mycena lilacifolia</i>			X	
<i>Mycena marginella</i>			X	
<i>Mycena monticola</i>	X		X	
<i>Mycena overholtsii</i>	X		X	
<i>Mycena quinaultensis</i>	X		X	
<i>Mycena tenax</i>			X	
<i>Mythicomycetes corneipes</i>			X	
<i>Neolentinus kauffmanii</i>	X		X	
<i>Pholiota albivelata</i>	X		X	
<i>Stagnicola perplexa</i>			X	
<b>Rare Gilled Mushrooms</b>				
<i>Clitocybe subditopoda</i>	X		X	
<i>Clitocybe senilis</i>	X		X	

**Appendix G-2. Species to be Protected Through Survey and Manage Guidelines  
(from the FSEIS ROD Table C-3)**

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<i>Neolentinus adherens</i>	X		X	
<i>Rhodocybe nitida</i>	X		X	
<i>Rhodocybe speciosa</i>	X		X	
<i>Tricholomopsis fulvescens</i>	X		X	
<b>Noble Polypore (rare and endangered)</b>				
<i>Oxyporus nobilissimus</i>	X	X	X	
<b>Bondarzewia Polypore</b>				
<i>Bondarzewia montana</i>	X	X	X	
<b>Rare Resupinates and Polypores</b>				
<i>Aleurodiscus farlowii</i>	X		X	
<i>Dichostereum granulosum</i>	X		X	
<i>Cudonia monticola</i>			X	
<i>Gyromitra californica</i>			X	X
<i>Gyromitra esculenta</i>			X	X
<i>Gyromitra infula</i>			X	X
<i>Gyromitra melaleucoides</i>			X	X
<i>Gyromitra montana</i> (syn. <i>G. gigas</i> )			X	X
<i>Otidea leporina</i>			X	
<i>Otidea smithii</i>	X		X	
<i>Plectania melastoma</i>			X	
<i>Podostroma alutaceum</i>			X	
<i>Sarcosoma mexicana</i>			X	
<i>Sarcosphaera eximia</i>			X	
<i>Spathularia flavidia</i>			X	
<b>Rare Cup Fungi</b>				
<i>Aleuria rhenana</i>				
<i>Bryoglossum gracile</i>				
<i>Gelatinodiscus flavidus</i>	X		X	
<i>Helvella compressa</i>	X		X	
<i>Helvella crassitunicata</i>	X		X	
<i>Helvella elastica</i>	X		X	
<i>Helvella maculata</i>	X		X	
<i>Neourmula pouchetii</i>	X		X	
<i>Pithya vulgaris</i>	X		X	
<i>Plectania latahensis</i>	X		X	
<i>Plectania milleri</i>	X		X	
<i>Pseudaleuria quinaultiana</i>	X		X	
<b>Club Coral Fungi</b>				
<i>Clavariadelphus ligula</i>			X	X

**Appendix G-2. Species to be Protected Through Survey and Manage Guidelines  
(from the FSEIS ROD Table C-3)**

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<i>Clavariadelphus pistillaris</i>			X	X
<i>Clavariadelphus truncatus</i>			X	X
<i>Clavariadelphus borealis</i>			X	X
<i>Clavariadelphus lovejoyae</i>			X	X
<i>Clavariadelphus sachalinensis</i>			X	X
<i>Clavariadelphus subfastigiatus</i>			X	X
<b>Jelly Mushroom</b>				
<i>Phlogitis helvelloides</i>			X	X
<b>Branched Coral Fungi</b>				
<i>Clavulina cinerea</i>			X	X
<i>Clavulina cristata</i>			X	X
<i>Clavulina ornatipes</i>			X	X
<b>Mushroom Lichen</b>				
<i>Phytoconis ericetorum</i>			X	X
<b>Parasitic Fungi</b>				
<i>Asterophora lycoperdoides</i>			X	
<i>Asterophora parasitica</i>			X	
<i>Collybia racemosa</i>			X	
<i>Cordyceps capitata</i>			X	
<i>Cordyceps ophioglossoides</i>			X	
<i>Hypomyces luteovirens</i>			X	
<b>Cauliflower Mushroom</b>				
<i>Sparassis crispa</i>			X	
<b>Moss Dwelling Mushrooms</b>				
<i>Cyphellostereum laeve</i>			X	
<i>Galerina atkinsoniana</i>			X	
<i>Galerina cerina</i>			X	
<i>Galerina heterocystis</i>			X	
<i>Galerina sphagnicola</i>			X	
<i>Galerina vittaeformis</i>			X	
<i>Rickenella setipes</i>			X	
<b>Coral Fungi</b>				
<i>Clavicornia avellanea</i>			X	



# Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<b>Lichens</b>				
<b>Rare Forage Lichen</b>				
<i>Bryoria tortuosa</i>	X		X	
<b>Rare Leafy (arboreal) Lichens</b>				
<i>Hypogymnia duplicata</i>	X	X	X	
<i>Tholurna dissimilis</i>	X		X	
<b>Rare Nitrogen-fixing Lichens</b>				
<i>Dendroscopaulon intricatum</i>	X		X	
<i>Lobaria hallii</i>	X		X	
<i>Lobaria linita</i>	X	X	X	
<i>Nephroma occultum</i>	X		X	
<i>Pannaria rubiginosa</i>	X		X	
<i>Pseudocyphellaria rainierensis</i>	X	X	X	
<b>Nitrogen-fixing Lichens</b>				
<i>Lobaria oregana</i>				X
<i>Lobaria pulmonaria</i>				X
<i>Lobaria scrobiculata</i>				X
<i>Nephroma bellum</i>				X
<i>Nephroma helveticum</i>				X
<i>Nephroma laevigatum</i>				X
<i>Nephroma parile</i>				X
<i>Nephroma resupinatum</i>				X
<i>Pannaria leucostictoides</i>				X
<i>Pannaria mediterranea</i>				X
<i>Pannaria saubinetii</i>				X
<i>Peltigera collina</i>				X
<i>Peltigera neckeri</i>				X
<i>Peltigera pacifica</i>				X
<i>Pseudocyphellaria anomala</i>				X
<i>Pseudocyphellaria anthraspis</i>				X
<i>Pseudocyphellaria crocata</i>				X
<i>Stricta beauvoisii</i>				X
<i>Stricta fuliginosa</i>				X
<i>Stricta limbata</i>				X
<b>Pin Lichens</b>				
<i>Calicium abietinum</i>				X
<i>Cladonia adaequatum</i>				X
<i>Calicium adspersum</i>				X

## Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<i>Calicium glaucellum</i>				X
<i>Calicium viride</i>				X
<i>Chaenotheca brunneola</i>				X
<i>Chaenotheca chrysocephala</i>				X
<i>Chaenotheca ferruginea</i>				X
<i>Chaenotheca furfuracea</i>				X
<i>Chaenotheca subroscida</i>				X
<i>Chaenotheca pusilla</i>				X
<i>Cyphellium inquinans</i>				X
<i>Microcalicium arenarium</i>				X
<i>Mycocalicium subtile</i>				X
<i>Stenocybe clavata</i>				X
<i>Stenocybe major</i>				X
<b>Rare Rock Lichens</b>				
<i>Pilophorus nigricaulis</i>	X		X	
<i>Stricta arctica</i>	X		X	
<b>Riparian Lichens</b>				
<i>Cetrelia cetrarioides</i>				X
<i>Collema nigrescens</i>				X
<i>Leptogium burnetiae</i> var. <i>hirsutum</i>				X
<i>Leptogium cyanescens</i>				X
<i>Leptogium saturninum</i>				X
<i>Leptogium teretiusculum</i>				X
<i>Platismatia lacunosa</i>				X
<i>Ramalina thrausta</i>				X
<i>Usnea longissima</i>				X
<b>Aquatic Lichens</b>				
<i>Dermatocarpon luridum</i>	X		X	
<i>Hydrothyria venosa</i>	X		X	
<i>Leptogium rivale</i>	X		X	
<b>Rare Oceanic Influenced Lichens</b>				
<i>Bryoria pseudocapillaris</i>	X		X	
<i>Bryoria spirallifera</i>	X		X	
<i>Bryoria subcana</i>	X		X	
<i>Buellia oidealea</i>	X		X	
<i>Erioderma sorediatum</i>	X		X	
<i>Hypogymnia oceanica</i>	X		X	
<i>Leioderma sorediatum</i>	X		X	
<i>Leptogium brebissonii</i>	X		X	
<i>Niebla cephalota</i>	X		X	
<i>Pseudocyphellaria mougeotiana</i>	X		X	

# Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<i>Teloschistes flavicans</i>	X		X	
<i>Usnea hesperina</i>	X		X	
<b>Oceanic Influenced Lichens</b>				
<i>Cetraria californica</i>	X		X	
<i>Heterodermia leucomelos</i>	X		X	
<i>Loxospora</i> sp. nov. "corallifera" (Brodo in dit)	X			
<i>Pyrrhospora quereana</i>	X		X	
<b>Additional Lichen Species</b>				
<i>Cladonia norvegica</i>			X	
<i>Heterodermia sitchensis</i>			X	
<i>Hygornia vittata</i>			X	
<i>Hypotrachyna revoluta</i>			X	
<i>Nephroma isidiosum</i>			X	
<i>Ramalina pollinaria</i>			X	
<b>Bryophytes</b>				
<i>Antitrichia curtipendula</i>				X
<i>Bartramioopsis lescurei</i>	X		X	
<i>Brotherella roelli</i>	X		X	
<i>Burbaumia piperi</i>				
<i>Diplophyllu albicans</i>	X		X	
<i>Diplophyllum plicatum</i>	X	X		
<i>Douinia ovata</i>				X
<i>Encalypta brevicollis</i> var. <i>crumiana</i>	X		X	
<i>Herbertus aduncus</i>	X		X	
<i>Herbertus sakuraii</i>	X		X	
<i>Iwatsukella leucotricha</i>	X		X	
<i>Kurzia makinoana</i>	X	X		
<i>Marsupella emarginata</i> var. <i>aquatica</i>	X	X		
<i>Orthodontium gracile</i>	X		X	
<i>Plagiochila satol</i>	X		X	
<i>Plagiochila semidecurrens</i>	X		X	
<i>Pleuroziopsis ruthenica</i>	X		X	
<i>Ptilidium californicum</i>	X	X		
<i>Racomitrium aquaticum</i>	X		X	
<i>Radula brunnea</i>	X		X	
<i>Rhizomnium nudum</i>				
<i>Scouleria marginata</i>				X
<i>Tetraxis geniculata</i>	X		X	
<i>Tritomaria exsectiformis</i>	X	X		
<i>Tritomaria quinqueidentata</i>	X		X	

## Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<b>Vascular Plants</b>				
<i>Allotropa virgata</i>	X	X		
<i>Bensoniella oregana</i> (California)	x	x		
<i>Cypripedium fasciculatum</i> (Klamath)	x	x		
<i>Cypripedium montanum</i> (west Cascades)	X	X		
<i>Pedicularis howellii</i>	x	x		
<b>Animals</b>				
<b>Mollusks</b>				
<i>Cryptomastix devia</i>	X	X		
<i>Cryptomastix hendersoni</i>	X	X		
<i>Derocera hesperium</i>	X	X		
<i>Fluminicola</i> n. sp. 1	X	X		
<i>Fluminicola</i> n. sp. 11	X	X		
<i>Fluminicola</i> n. sp. 14	X	X		
<i>Fluminicola</i> n. sp. 15	X	X		
<i>Fluminicola</i> n. sp. 16	X	X		
<i>Fluminicola</i> n. sp. 17	X	X		
<i>Fluminicola</i> n. sp. 18	X	X		
<i>Fluminicola</i> n. sp. 19	X	X		
<i>Fluminicola</i> n. sp. 2	X	X		
<i>Fluminicola</i> n. sp. 20	X	X		
<i>Fluminicola</i> n. sp. 3	X	X		
<i>Fluminicola seminalis</i>	X	X		
<i>Helminthoglypta hertleini</i>	X	X		
<i>Helminthoglypta talmadgei</i>	XX	X		
<i>Hemphillia barringtoni</i>	X	X		
<i>Hemphillia glandulosa</i>	X	X		
<i>Hemphillia malonei</i>	X	X		
<i>Hemphillia pantherina</i>	X	X		
<i>Juga</i> (O.) n. sp. 2	X	X		
<i>Juga</i> (O.) n. sp. 3	X	X		
<i>Lyogyryus</i> n. sp. 1	X	X		
<i>Lyogyryus</i> n. sp. 2	X	X		
<i>Lyogyryus</i> n. sp. 3	X	X		
<i>Megomphix hemphilli</i>	X	X		
<i>Monadenia chaceana</i>	XX	X		
<i>Monadenia churchi</i>	X	X		
<i>Monadenia fidelis minor</i>	X	X		
<i>Monadenia troglodytes</i>				
<i>Monadenia troglodytes wintu</i>	X	X		
<i>Orcohelix</i> n. sp.	XX	X		
<i>Pristiloma artium crateris</i>	X	X		
<i>Prophysaon coeruleum</i>	X	X		
<i>Prophysaon dubium</i>	X	X		
<i>Trilobopsis roperi</i>	X	X		

## Appendix G-2. Species to be Protected Through Survey and Manage Guidelines (from the FSEIS ROD Table C-3)

Species	Survey Strategies <sup>1</sup>			
	1	2	3	4
<i>Trilobopsis tehamana</i>	X	X		
<i>Vertigo n. sp.</i>	X	X		
<i>Vespericola pressleyi</i>	X	X		
<i>Vespericola shasta</i>	X	X		
<i>Vorticifex flamathensis sinitsini</i>	X	X		
<i>Vorticifex n. sp. 1</i>	X	X		
<i>Prophysaon coeruleum</i>	X	X		
<b>Anthropods</b>				
Canopy herbivores (south range)				X
Coarse wood chewers (south range)				X
Litter and soil dwelling species (south range)		X		
Understory and forest gap herbivores			X	
<b>Amphibians</b>				
Del Norte salamander		X		
Siskiyou Mountains salamander	X	X		
<b>Mammals</b>				
Red tree vole ( <i>P. longicaudus</i> )		X		

<sup>1</sup>Survey Strategies:

1: manage known sites,

2: survey prior to activities and manage sites,

3: conduct extensive surveys and manage sites, and

4: conduct general regional surveys.

**Appendix G-3. Medford District BLM  
Protection Buffer Species Identified In the  
FSEIS ROD**

---

**Protection  
Buffers**

---

**Nonvascular Plants**

**Moss**

*Ulota meglospora*

**Liverwort**

*Ptilidium californicum*

**Fungi**

*Aleuria rhenana*

*Otidea leporina*

*O. onotica*

*O. smithii*

**Animals**

Del Norte salamander	Matrix
Siskiyou Mountain salamander	Matrix
White-headed woodpecker	Matrix
Black-backed woodpecker	Matrix
Pygmy nuthatch	Matrix
Flammulated owl	Matrix
Great gray owl	LSR

---

Additional species will be protected with buffers around known sites but were not referred to specifically as "Protection Buffers" in the FSEIS ROD. Examples include northern spotted owls, marbled murrelets, several bat species, most special status plant species, etc. For more information and details refer to text in Chapter 2 of the PRMP/FSEIS.

---

# Appendix H

## Potential Management of Candidate ACECs Dropped From ACEC Consideration<sup>1</sup>

Area Name	Acres	Primary Value Description	Alt.	Management Allocations/Direction
Section Six	130	The area has a perennial stream with native trout; 40 acres are in a SOMA.	NA	Available for a variety of multiple uses, including timber management.
			A	Available for a variety of multiple uses, including timber management.
			B	Will have road constructed.
			C	Available for a variety of multiple uses, including timber management.
			D	Available for a variety of multiple uses, including timber management.
Slide Creek	77	Natural systems of old growth Douglas-fir/Oregon grape community. Unique waterfalls.	E	Grazing. Available for a variety of multiple uses, including timber management.
			NA	Available for a variety of multiple uses, including timber management.
			A	Area would be managed for timber harvest.
			B	Area would be managed for timber harvest.
			C	Available for a variety of multiple uses, including timber management.
			D	Area would be managed for timber harvest.
			E	Available for a variety of multiple uses, including timber management.

<sup>1</sup>These areas were nominated for ACEC consideration but did not meet the relevance and/or importance criteria.





# Appendix I

## Management of Candidate ACECs not Selected in the Proposed Resource Management Plan

Area	Management Allocations/Direction
Bill Creek	Managed as part of an LSR.
Cedars of Beaver Creek	Available for a variety of multiple uses, including timber management.
Enchanted Forest	Major values included within an RMA. Available for a variety of multiple uses, including timber management.
Flounce Rock	Ten acres designated as an ACEC. The remainder designated as an EEA. Managed as part of an LSR.
Larkspur	There are 1,587 acres in two RNAs, Pipe Fork and Grayback Glades. Managed as part of an LSR.
Little Hyatt	Available for a variety of multiple uses, including timber management.
Pacific Crest Trail	Seven miles in LSR. Available for other resource uses if not part of the PCT management plan. 50 feet either side of trail included in SRMA. One-quarter mile either side of trail managed as VRM Class II.
Rogue River	There are 14,277 acres in the wild and scenic river designation. The remainder available for other resource uses. VRM Class II management for lands seen from river. Part of area within an LSR.
Siskiyou Mountain Natural Area	Major portion of LSR. 2,847 acres in two RNAs, Scotch Creek and Oregon Gulch. Two ACECs, Jenny Creek and Pilot Rock. 25,000 acres in Cascade/Siskiyou special emphasis area.
Williams Watershed	There are 1,587 acres in two RNAs, Pipe Fork and Grayback Glades. Managed as part of an LSR.



# Appendix J

## Wild and Scenic Rivers Suitability Assessments

This appendix contains suitability assessments for 4 of the 92 river segments previously found eligible as Wild for inclusion in the National Wild and Scenic Rivers System National Wild, Scenic, and Recreation System (NWSRS). The 44 river segments found eligible but not assessed for suitability did not meet minimum suitability requirements. The primary reasons for not assessing suitability on these segments include:

- BLM does not administer sufficient control,
- generally considered to be at least 40 percent of the study segment, and
- to protect the values which made the rivers eligible.

Suitability assessments are included for each of the four river segments found eligible and recommended as suitable for inclusion in the NWSRS. The river segments are Big Windy Creek, Dulog Creek, East Fork Big Windy Creek, and Howard Creek (see Map 2-3). In the Draft RMP/EIS, Mule Creek was found suitable, however, these lands are now administered by the Forest Service.

This introduction to the individual suitability assessments, in addition to general background material, contains information on potential land acquisition, public involvement, suitability criteria, and comparative river segment quality that applies to each assessment.

The analysis of a river's potential for designation under the National Wild and Scenic Rivers Act involves three separate steps: determination of eligibility, classification, and finding of suitability. Rivers or river segments can be classified as Wild, Scenic, or Recreational river areas. Final designation decisions are made by Congress.

To be eligible for designation a river or river segment must be free flowing and possess at least one outstandingly remarkable value. Eligibility and potential classification decisions were previously made in the planning process. These documents are on file at the Medford District Office. Appendix 2-WS-

1, Draft RMP, contains eligibility and classification criteria used in that process.

All river segments included in this appendix are within state comprehensive outdoor recreation plan (SCORP) Region 9 (see Map 2-14 in the map packet). Ninety-two (92) streams were reviewed to fulfill analysis requirements for eligibility determination. A summary of eligibility and highest potential classification is shown in Chapter 3, Table 3-WSR-2, Draft RMP.

Criteria specified in Section 4(a) of the Wild and Scenic Rivers Act provides a basis for suitability assessment. Suitability findings by alternative are shown in Chapter 2, Table 2-19. These criteria are specifically addressed in the individual suitability assessments and are as follows:

- the characteristics that do or do not make the area a worthy addition to the system;
- the current status of land ownership and use in the area;
- the reasonably foreseeable potential uses of the land and water which would be enhanced, foreclosed, or curtailed if the area were included in the NWSRS;
- the federal agency that should administer the river;
- the extent to which the costs thereof would be shared by state and local agencies; and
- the estimated cost to the United States of acquiring necessary land and interest in land and of administering the area, should it be added to the system.

In the Analysis of the Management Situation (AMS) Summary, BLM stated a separate Legislative Environmental Impact Statement (LEIS) would be prepared for river or river segments found suitable for designation as a component of the NWSRS. The LEIS would have been the method of forwarding the findings and recommendations to Congress. However, it has subsequently been decided that the Medford District RMP/EIS will serve as the only EIS

analyzing suitability findings and whatever recommendations are made later for inclusion in the system. Final designation decisions are made by the Congress.

For river segments found eligible, but not assessed for suitability and those assessed and found suitable, all BLM-administered land within one-quarter mile on either side of the river segments will be afforded a level of interim management necessary for protection of identified outstandingly remarkable values. This interim management will continue until a final determination is made. Interim management will follow the guidelines presented in Appendix 2-WS-2, Draft RMP.

The Federal government does not manage private land within designated Wild, Scenic, or Recreational river areas and has no zoning authority over these lands under the Act. The Federal government's authority to affect private lands is primarily through the acquisition authorities conferred in the National Wild and Scenic Rivers Act. Except for the acquisition of land or interest in lands, for which just compensation is made, the agencies cannot regulate the use of private property via this law. Section 6(b) of the Wild and Scenic Rivers Act prohibits federal condemnation to purchase fee title lands when 50 percent or more of a designated river corridor is public land (federal, state, county, etc.). However, Section 6(b) does allow the use of condemnation to purchase scenic easements as a measure of last resort to remove or prevent a threat to the river or its outstandingly remarkable values.

Private land ownership is legitimate within designated river boundaries and existing private land uses are often consistent with management goals of Wild, Scenic, or Recreational river areas. Carefully conducted ranching, farming, mining, and forest management activities within the "Scenic" and "Recreational" river classifications may continue. Assistance to private landowners may be provided by the Federal government to encourage practices that enhance the river's natural values such as water quality and quantity, streambank stability, and riparian habitat.

There has been minimal public involvement concerning the suitability of rivers found eligible for potential designation. Comments raised during public review of the AMS concerning designation into the NWSRS were evenly divided. Concerns raised were about adequately planning for recreational activities along the riverbank, mining restrictions, and logging restrictions. Public responses are on file at the Medford District Office. There were 91 comments

(mostly form letters) received on wild and scenic rivers during public review of the Draft RMP/EIS.

Based on planning criteria in the State Director's Guidance for formulation of planning alternatives (see Appendix B), BLM made a comparison of outstandingly remarkable values associated with each eligible river segment in each SCORP region. Rivers were found suitable for designation in the NWSRS in the different alternatives based on whether one or more of its outstandingly remarkable values were ranked among the top four (Alternative D), top two (Alternative C), or top one (Alternative B) river(s) in its SCORP region. Rivers that are already included in the NWSRS were ranked equally as being among the top river(s) in the SCORP region.

Four designated rivers (the Rogue, Upper Rogue, Illinois, and North Umpqua) and one Congressionally-mandated study river (the upper Klamath) flow through SCORP Region 9. Therefore, the outstandingly remarkable values associated with those rivers were ranked above those on nondesignated rivers. The four highest ranked river areas per outstandingly remarkable value are shown in Table WSR-1 and are listed first. The only segments being studied through this planning process that possess outstandingly remarkable values which rank in the top four for SCORP Region 9 are Whiskey Creek (historic) and Antelope Creek (cultural). Both the eligibility and suitability determinations were coordinated with all appropriate BLM Districts and National Forests in the SCORP region.

## East Fork Big Windy Creek

### Summary

The 3.6-mile segment of East Fork Big Windy Creek is found suitable for designation as a Wild river under the National Wild and Scenic Rivers Act.

### Background

#### Description of the River

The Medford District identified as eligible a 3.6-mile segment of East Fork Big Windy Creek from headwaters of East Fork Big Windy Creek in T.34S.,

Table WSR-1. Ranking of Outstandingly Remarkable Values in Region 9

River Segment	Recreation	Geological	Fish	Wildlife	Scenic	Cultural	Historical	Other <sup>1</sup>
Rogue <sup>2</sup>	X		X	X	X		X	
Illinois	X		X		X			X
Klamath <sup>3</sup>	X		X	X	X	X	X	X
North Umpqua <sup>2</sup>	X		X		X			
Upper Rogue <sup>2</sup>	X		X				X	
Whiskey Creek (to east and north forks)							X	
Antelope Creek (Segments A and C)					X			

<sup>1</sup>Other (Water quality, hydrological, botanical, vegetation, ecological, biological, and diversity).<sup>2</sup>River segments previously designated.<sup>3</sup>Segment 2 of the upper Klamath ranks in the top 1 or 2 rivers for cultural, historical, and other outstandingly remarkable values.

R.9W., Section 22, SW<sub>1</sub>, to confluence with Big Windy Creek (see Map T.34S., R.9W).

**Segment one:** Segment one consists of the creek flowing through section 14 and includes the northernmost quarter mile of section 23. Large woody debris in varying stages of decomposition was present. The water flowed beneath the channel substrate through the crescent shaped floodplain. Furthermore, it is thought that by autumn the flow will become subsurface upstream from the first major confluence found in the middle of section 14. The creek is a series of cascades, riffles, and small pools and falls. Water volume doubles at the confluence in section 14.

The creek channel has been carved into deep and narrow crevices.

The substrate ranges from sand to one meter diameter boulders. The vegetation is thick with a canopy cover of 50 percent and greater. The feeling of isolation is greatest here due to the vegetative screening.

**Segment two:** Segment two starts near the border of section 14-11 and ends at the confluence with Big Windy Creek. The falls increase in height and pools become larger and deeper. There are fewer riffles and cascades as the creek has become a series of falls and pools. The canopy is generally 50 percent and less. A broader feeling of wilderness due to the open views of upper canyon seen in the pools.

East Fork Big Windy Creek is a prime example of a wilderness creek that has had minimal, if any, human-caused disturbance. Any human-caused disturbances have been mitigated by time and are no longer evident.

### Eligibility Determination

The entire creek segment was found to be free flowing and have three outstandingly remarkable values: scenery, recreation, and fisheries.

**Scenery:** The entire stretch is in very steep and rough terrain. The canyon walls range from 40 percent to vertical with cliffs and rock outcrops. In many places erosion has created a stream channel with spectacular slides, cascades, falls, and pools of varying sizes. Many of these creations are contained within gorges with near vertical sides or sheer rock. The riparian zone is very narrow with the exception of a 35-by-60 meter crescent shaped floodplain located near the northern border of section 23.

East Fork Big Windy Creek has a narrow riparian zone with the associated diversity of vegetation including but not limited to alder and ash trees, big leaf and vine maples, ferns, huckleberries, and many flowers. The vegetative canopy over the creek varies from 0 to 100 percent. Most areas were clear of moss.

Water along the entire segment is clear, cold, and presumably unpolluted. This water flows through cascades a few to many meters in length and over

## Appendix J

falls of up to 3 meters in height. Pools range in depth from shallow to a few meters and in length from one to 20 meters. However, one must consider the time of year and resultant water volume.

Color along the creek is shown in a variety of greens in the vegetation, grays and browns in the rocks and soil, and blues and greens in the water, especially the pools. In autumn there would be yellows, oranges, and reds in the leaves.

When not under a thick riparian canopy, hardwood thickets of live oak and madrone, stands of mixed conifers, and rock outcrops and slides could be seen along the nearby steep canyon walls.

**Recreation:** There is no evidence of human activity. The terrain is steep and rocky and would be difficult for most people. There are no trails. The chance of seeing other people would be very slim. The area definitely gives one a feeling of wilderness, isolation, and solitude.

**Fisheries:** Fish of varying sizes were sighted along the creek in section 11. However, it is thought fish also live further upstream. Anadromous migration upstream could occur only during high water as there is a 3 to 4 meter waterfall in section 11. Anadromous fish migration upstream could occur only during high water do the presence of a 3 to 4 meter waterfall in section 11 that could be the upstream limit. Thus the creek appears to be dominated by resident fish. The upstream limit of resident fish is probably at the origin of the crescent shaped floodplain described above. The upper section is thick with vegetation which adds insects and detritus to the aquatic system. The creek is good fish habitat with many of the pools and riffles having sand or gravel bottoms or bars that would be suitable for spawning. Further downstream are larger pools with wood, rock, and deep water providing hiding cover. The riparian zone in section 11 opens allowing more sunlight in; however, the water volume is probably enough to keep the temperature low and good for fish.

This suitability assessment was prepared based on these findings and BLM's 100 percent administrative jurisdiction within the one-half mile river corridor.

## Classification Determination

The river's highest potential classification is Wild as shown. The river is free of any impoundments, diversions, or streambank modifications. There is no shoreline development. There is no logging activity within view of the creek. Water quality and quantity is

excellent and supports the river corridor's outstandingly remarkable values.

Access is limited to foot travel.

## Potential Classification Summary

Activity	Wild	Scenic	Recreational
Water resources development	M	M	E
Shoreline development	M	E	E
Water quality	M	E	E
Accessibility	M	E	E

M: Meets

DM: Does not meet

E: Exceeds

## Suitability Factors

## Current Land Status and Use

### Land Ownership

The Medford BLM District administers 3.6 stream frontage miles (both sides included) which is 100 percent of the suitable river segment as shown.

### Segment Ownership and Status Within the Creek Corridor

Ownership	Acres	Percent
BLM		
Public Domain	1,440	100
O&C lands		
Forest Service		
State		
County		
Timber co.		
Private individuals		
Total	1,440	100

## Land Use

Land uses within the one-half mile river corridor are varied. No timber harvest activity has occurred within the river corridor or within sight of the river corridor. Livestock grazing and agricultural activities do not occur within the river corridor. There is no private land within the corridor. Josephine County has zoned the corridor as Forest Commercial.



There are no mining claims located within the river corridor and no federal mineral leases are in effect.

### **Reasonable Foreseeable Uses of the Land and Water Which Would be Affected By Designation**

Appendix 2-WS-2, Draft RMP, provides a general description of land uses and management practices appropriate for wild, scenic, and recreational river areas. Consequences by plan alternative are displayed in Table 4-WS-1.

### **Uses That Would Be Enhanced By Designation**

Current and potential uses on BLM-administered lands in the river watershed are expected to be compatible with a scenic or recreational classification (VRM Class III). With the highest potential classification of Wild, the visual resource management would be more restrictive.

Designation as Wild would lead to VRM Class I (VRM II if scenic or recreational) management of BLM-administered land in the 1/2-mile river corridor, protecting and enhancing its scenic value, wildlife habitat value, and fisheries and thus indirectly its recreational potential. It is possible that the application of a higher water quality standard due to its designation would require more careful timing of BLM timber sales in the watershed. If the river were designated as recreational, BLM management would be similar in most respects to management without designation but BLM's management presence would increase, diminishing inappropriate uses and thus enhancing the river segment's recreational use.

### **Uses That Would Be Foreclosed By Designation**

No existing uses would be foreclosed by designations as wild except mining for hardrock minerals which has low to moderate potential.

### **Uses That Would Be Curtailed By Designation**

Designation as Wild would lead to VRM Class I management of BLM-administered lands in the 1/2-mile corridor, eliminating timber management on those lands and diminishing the rate of timber harvest from them. Designation as either wild, scenic, or recreational would lead to application of a higher water quality standard, requiring more careful timing

of BLM timber sales in the upstream watershed which could also diminish the rate of timber harvest but on a larger area.

### **Hydroelectric Potential**

The potential hydroelectric power available in any stream reach is determined by the formula:  $p=cQH_e$  where:

$$\begin{aligned} p &= \text{power (kilowatts)} \\ c &= \text{conversion factor} = 0.08475 \\ Q &= \text{streamflow (ft}^3/\text{sec)} \\ H &= \text{head (feet)} \\ e &= \text{efficiency} = 1.0 \end{aligned}$$

Using data contained in the Oregon State University's Water Resources Research Institute's 1979 study entitled, "A Resource Survey of Low-Head Hydroelectric Power Potential in Oregon," the theoretical hydroelectric power potential for this segment of East Fork Big Windy Creek would be:

$$P = (0.08475) (Q) (H) (1.0) = 5,847.75 \text{ kilowatts}$$

There is no Federal Energy Regulatory Commission (FERC) application, irrigation, or other proposals for dams or diversions on file for this river segment.

### **Effect on Outstandingly Remarkable Values**

#### **Those Enhanced if River Segment Were Designated**

Designation would ensure the continued availability of recreation opportunities occurring in this river segment including swimming, fishing, hiking, and sightseeing. Other recreation uses occurring in the area such as picnicking, wildlife observation, nature photography, and camping would also continue. Designation would enhance wildlife populations by helping to preserve existing habitat. Bald Eagle habitat and nesting would continue to be protected by the Endangered Species Act, and management of riparian areas would provide appropriate protection of fisheries habitat.

#### **Those Diminished if River Segment Were Not Designated**

Recreation opportunities would not be provided long-term protection afforded by designation. Management of these opportunities as specified in the PRMP would not include any development of access or other facilities. Continued increases in recreation use

would lead to more crowding, littering, vandalism, and environmental damage.

### **How the River Segment Would Be Managed if It Were Not Designated or if Designated at a Lower Classification**

If the river were not added to the National Wild and Scenic Rivers System, the BLM would manage land under its jurisdiction within the one-half mile corridor for protection of the riparian values and for continuation of existing levels of use within the corridor. The outstandingly remarkable values of wildlife, fish, and recreation would have a level of protection by such management. Lands in the 1/2-mile corridor but outside the riparian zone would be subject to timber harvest and would be managed under VRM Class III standards. This could diminish the scenic attributes of the river corridor.

If the river were added to the system but designated as recreational, management would be similar to that if it were not designated. Increased public use due to its higher visibility could require more management of recreational use.

### **Cost of Administration**

The basic objective of wild and scenic river designation is to maintain the river's existing condition. If a land use or development clearly threatens the outstandingly remarkable values which resulted in the river's designation, efforts will be made to remove the threat through local zoning, State Scenic Waterway Act provisions, land exchanges, purchases from willing sellers, and other actions short of condemnation. In the event condemnation becomes necessary, the only landowner rights which will be purchased are those necessary to remove the threat to the specific river value.

Any actual or potential threat to a river's outstandingly remarkable values, together with specific options to remove or mitigate that threat can only be determined on a case-by-case basis. Because of variable river values and possible threats and protection mechanisms, estimated costs of acquiring necessary lands or interests in lands will be made in the river study report for rivers determined suitable and subsequently recommended for designation and/or in the river management plan required to be completed within three full fiscal years of designation.

The estimated cost of preparing a required river management plan for this stream segment would be \$30-40,000. Annual river management, administration, and monitoring costs are estimated to be \$3-6,000. Cost estimates for resource protection measures and necessary public use facilities would be determined through the river management planning process.

No state or local agency has come forward and stated they would be willing to share in the cost of administering this river segment should it become part of the system. In light of the financial constraints imposed by Oregon ballot "Measure 5," it is unlikely that state or local agencies would share in these costs.

### **Administering Agency**

If East Fork Big Windy Creek were added to the National Wild and Scenic Rivers System, BLM would continue to manage the land and resources it currently administers.

### **Finding and Rationale**

#### **Finding**

The 3.6-mile segment of East Fork Big Windy Creek from headwaters of East Fork Big Windy Creek in T.34S., R.9W., Section 22, SW1/4, to confluence with Big Windy Creek is found suitable for Federal designation as a Wild river under the National Wild and Scenic Rivers Act.

### **Characteristics Which Do or Do Not Make the Area a Worthy Addition to the System**

The 100 percent Federal ownership within one-half mile corridor of this segment and the presence of outstandingly remarkable values would make this a meaningful addition to the national system. This creek's outstandingly remarkable values are distinctive but similar to other creeks in the Rogue Valley. Management to a less restrictive standard would probably lead to a decline in the river's outstandingly remarkable values.

Designation as wild, scenic, or recreational under the Act could cause a slight loss in employment and slightly restrict private landowners. The greatest positive effect from designation as scenic would be the long-term protection of the outstandingly remarkable values within the river segment. The greatest negative effect would be the restriction on



new land uses, developments, and activities that could, if allowed, negatively affect the outstandingly remarkable values.

Although the East Fork Big Windy Creek is distinctive it can be considered similar to other creeks in the Rogue Valley. However, the character of all "Wild" creeks, while seemingly abundant at present, is slowly being changed by the intrusions of man in the form of logging, mining, and other development activities. It is important that some of these creeks be preserved in an undeveloped state for the enjoyment of future generations. The designation of this creek under the National Wild and Scenic Rivers Act is one way to ensure its continued protection.

## Dulog Creek

### Summary

An .8-mile segment of Dulog Creek is found suitable for designation as a Wild river under the National Wild and Scenic Rivers Act.

### Background

#### Description of the River

The Medford District identified as eligible a 1.5-mile segment of Dulog Creek described as headwaters of Dulog Creek in T.33S., R.9W., Section 28, NW1/4, to confluence with Rogue River (see Map T.33S., R.9W.). After further inspection, the upper .7-mile of Dulog Creek was found not suitable for designation due to extensive logging and road building.

The lower 8/10-mile described as from BLM Road #34-8-36 in T.33S., R.9W., Section 21 SW1/4 to confluence with Rogue River was found to be suitable for designation. The remainder of this report refers to this segment only.

This segment flows through a narrow, forested canyon with moderate to steeply sloping sides. The gradient of the creek is steep and has an impassible waterfall approximately 6/10 of a mile from the road.

Dulog Creek is a prime example of a wilderness creek that has had minimal, if any, human-caused disturbance. Any human-caused disturbances have been mitigated by time and are no longer evident.

### Eligibility Determination

The entire creek segment was found to be free flowing and have two outstandingly remarkable values: scenery and recreation.

**Scenery:** The waterfall is a spectacular example of a waterfall on a small stream. The surrounding scenery is composed of forest with some rock outcropping.

**Recreation:** People floating the Rogue-Wild section often stop at Dulog Creek and hike an unmaintained trail to view Dulog Falls. Dulog Falls is approximately 150 feet high.

This suitability assessment was prepared based on these findings and BLM's 100 percent administrative jurisdiction within the 1/2-mile river corridor.

### Classification Determination

The river's highest potential classification is Wild as shown below. The river is free of any impoundments, diversions, or streambank modifications. There is no shoreline development. Logging activity adjacent to the creek is ongoing but is above and out of view of the creek and is completely screened by topography. Water quality and quantity is excellent and supports the river corridor's outstandingly remarkable values.

Dulog Creek is accessible by foot only from the Rogue River or BLM Road #34-8-36.

Potential Classification Summary

Activity	Wild	Scenic	Recreational
Water resources development	M	M	E
Shoreline development	M	E	E
Water quality	M	E	E
Accessibility	M	E	E

M: Meets

DM: Does not meet

E: Exceeds

### Suitability Factors

#### Current Land Status and Use

#### Land Ownership

The Medford BLM District administers .8 stream-frontage miles (both sides included) which is 100 percent of the suitable river segment as shown.

## Segment Ownership and Status Within the Creek Corridor

Ownership	Acres	Percent
BLM		
Public Domain	256	100
O&C lands		
Forest Service		
State		
County		
Timber co.		
Private individuals		
Total	256	100

## Land Use

Land uses within the one-half mile river corridor are varied.

There has been no timber harvesting on private land or residential developments within the river corridor. There are no undeveloped lots zoned for residential development. Livestock grazing and agricultural activities do not occur within the river corridor. There are no mining claims located within the river corridor and no federal mineral leases are in effect.

Josephine County has zoned the corridor as Forest Commercial.

## Reasonable Foreseeable Uses of the Land and Water Which Would be Affected By Designation

Appendix 2-WS-2, Draft RMP, provides a general description of land uses and management practices appropriate for wild, scenic, and recreational river areas. Consequences by plan alternative are displayed in Table 4-WS-1.

## Uses That Would Be Enhanced by Designation

Current and potential uses on BLM-administered lands in the river watershed are expected to be compatible with a recreational classification (VRM Class III). With the highest potential classification wild, the visual resource management would be more restrictive.

Designation as wild would lead to VRM Class I management of BLM-administered land in the 1/2-mile river corridor, protecting and enhancing its

scenic value and wildlife habitat values, and thus, indirectly its recreational use. It is possible that the application of a higher water quality standard due to its designation would require more careful timing of BLM timber sales in the watershed. If the river was designated as recreational, BLM management would be similar in most respects to management without designation but BLM's management presence would increase, diminishing inappropriate uses and thus enhancing the river segment's recreational use.

## Uses That Would Be Foreclosed By Designation

Designation as wild could lead to imposition of county zoning restrictions on currently subdivided but undeveloped lands, or to federal efforts to acquire scenic easements limiting development on such lands, foreclosing some development options.

## Uses That Would Be Curtailed By Designation

Designation as Wild would lead to VRM Class I management of BLM-administered lands in the 1/2-mile corridor, constraining/eliminating timber management on those lands and diminishing the rate of timber harvest from them. Designation as either wild, scenic, or recreational would lead to application of a higher water quality standard, requiring more careful timing of BLM timber sales in the upstream watershed which could also diminish the rate of timber harvest but on a larger area.

Any patent issued pursuant to a mining claim will convey a right or title only to the mineral deposits and such rights only to the use of the surface and the surface resources as are reasonably required to carry on prospecting or mining operations.

If the river is designated as wild, subject to valid existing rights, the minerals in Federal lands which are part of the system and constitute the bed or bank or are situated within one-quarter mile of the bank will be withdrawn from all forms of appropriation under the mining laws and from operation of the mineral leasing laws.

## Hydroelectric Potential

The potential hydroelectric power available in any stream reach is determined by the formula:  $P=cQH_e$  where:

$P$  = power (kilowatts)  
 $c$  = conversion factor = 0.08475

Q = streamflow (ft<sup>3</sup>/sec)

H = head (feet)

e = efficiency = 1.0

Using data contained in the Oregon State University's Water Resources Research Institute's 1979 study entitled, "A Resource Survey of Low-Head Hydroelectric Power Potential in Oregon," the theoretical hydroelectric power potential for this segment of Dulog Creek would be:

$$P = (0.08475) (Q=30) (H=1,320) (1.0) = 3,356 \text{ kilowatts}$$

There is no Federal Energy Regulatory Commission (FERC) application, irrigation, or other proposals for dams or diversions on file for this river segment.

### Effect on Outstandingly Remarkable Values

#### Those Enhanced if River Segment Were Designated

Designation would ensure the continued availability of recreation opportunities occurring in this river segment including hiking, and sightseeing. Other recreation uses occurring in the area such as picnicking, wildlife observation, nature photography, and camping would also continue to be available. Designation would enhance wildlife populations by helping to preserve existing habitat. Management of riparian areas would provide appropriate protection of fisheries habitat.

#### Those Diminished if River Segment Were Not Designated

Recreation opportunities would not be provided long-term protection afforded by designation. Management of these opportunities as specified in the PRMP would not include any development of access or other facilities. Continued increases in recreation use would lead to more crowding, littering, vandalism, and environmental damage.

#### How the River Segment Would Be Managed if it Were Not Designated or if Designated at a Lower Classification

If the river were not added to the National Wild and Scenic Rivers System, the BLM would manage land under its jurisdiction within the one-half mile corridor for protection of the riparian values and for continuation of existing levels of use within the corridor. The outstandingly remarkable values of

wildlife, fish, and recreation would have a level of protection by such management. Lands in the 1/2-mile corridor but outside the riparian zone, would be subject to timber harvest and would be managed under VRM Class II standards. This could diminish the scenic attributes of the river corridor. Additional development of subdivided private lands could also diminish the scenic attributes. In combination, such actions would probably degrade the river's eligibility classification to recreational but should not alter the outstandingly remarkable values.

If the river were added to the system but designated as Recreational, management would be similar to that if it were not designated. Increased public use due to its higher visibility could require more management of recreational use.

### Cost of Administration

The basic objective of wild and scenic river designation is to maintain the river's existing condition. If a land use or development clearly threatens the outstandingly remarkable values which resulted in the river's designation, efforts will be made to remove the threat through local zoning, State Scenic Waterway Act provisions, land exchanges, purchases from willing sellers, and other actions short of condemnation. In the event condemnation becomes necessary, the only landowner rights which will be purchased are those necessary to remove the threat to the specific river value.

Any actual or potential threat to a rivers outstandingly remarkable values, together with specific options to remove or mitigate that threat, can only be determined on a case-by-case basis. Because of variable river values, possible threats, and protection mechanisms estimated costs of acquiring necessary lands or interests in lands will be made in the river study report for rivers determined suitable and subsequently recommended for designation and/or in the river management plan required to be completed within three full fiscal years of designation.

The estimated cost of preparing a required river management plan for this stream segment would be \$30-40,000. Annual river management, administration, and monitoring costs are estimated to be \$3-6,000. Cost estimates for resource protection measures and necessary public use facilities would be determined through the river management planning process.

No state or local agency has come forward and stated they would be willing to share in the cost of

administering this river segment should it become part of the system. In light of the financial constraints imposed by Oregon ballot "Measure 5," it is unlikely that state or local agencies would share in these costs.

## Administering Agency

If Dulong Creek were added to the National Wild and Scenic Rivers System, the BLM would continue to manage the land and resources it currently administers.

## Finding and Rationale

### Finding

The Medford District Office identified as eligible a 1.5-mile segment of Dulong Creek described as headwaters of Dulong Creek in T.33S., R.9W., Section 28, NW1/4, to confluence with Rogue River (see Map T33S9W). After further inspection, the upper .7-mile of Dulong Creek was found not suitable for designation due to extensive logging and road building.

The .8-mile segment of Dulong Creek from BLM Road #34-8-36 in T.33S., R.9W., Section 21 SW1/4 to confluence with the Rogue River is found suitable for Federal designation as a Wild river under the National Wild and Scenic Rivers Act.

## Characteristics Which Do or Do Not Make the Area a Worthy Addition to the System

The 100 percent majority of federal ownership within one-half mile corridor of this segment and the presence of two outstandingly remarkable values would make this a meaningful addition to the national system. This creeks outstandingly remarkable values are distinctive but similar to other creeks in the Rogue Valley. Management to a less restrictive standard would probably lead to a decline in the river's outstandingly remarkable values.

Designation as wild, scenic, or recreational under the Act could cause a slight loss in employment and slightly restrict private landowners. The greatest positive effect from designation as scenic would be the long-term protection of the outstandingly remarkable values within the river segment. The greatest negative effect would be the restriction on new land uses, developments, and activities that could, if allowed, negatively affect the outstandingly remarkable values.

Although Dulong Creek is distinctive, it can be considered similar to other creeks in the Rogue Valley. However, the character of all "Wild" creeks while seemingly abundant at present is slowly being changed by the intrusions of humans in the form of logging, mining, and other development activities. It is important that some of these creeks be preserved in an undeveloped state for the enjoyment of future generations. The designation of this creek under the National Wild and Scenic Rivers Act is one way to ensure its continued protection.

In addition, the protection of this creek, which is tributary to the Rogue Wild and Scenic River, will help protect the integrity of the outstandingly remarkable values that caused the Rogue River to be designated.

## Big Windy Creek

### Summary

The 6.8-mile segment of Big Windy Creek is found suitable for designation as a Wild river under the National Wild and Scenic Rivers Act.

### Background

#### Description of the River

The Medford District identified as eligible a 6.8-mile segment of Big Windy Creek from the headwaters of Big Windy Creek in T.34S., R.9W., Section 7, SW1/4 to confluence with Rogue River (see Maps T.33S., R.9W., T.34S., R.9W., and T.34S., R.10W).

This entire stretch is steep country with rough terrain. The canyon walls range from 40 percent to vertical with cliffs and rock outcroppings. In many places, the creek bed is carved out of solid rock, forming pools and sheer rock gorges with rock and gravel bottoms.

Big Windy Creek has a very narrow riparian zone with the associated diversity of vegetation including but not limited to alder trees, ash trees, big-leaf maples, vine maples, evergreen ferns, monkey-flowers, etc. There are also a few populations of yew. Above the riparian zone on the hillsides and cliffs, there are tan oaks, canyon live oaks, and huckleberry.

Water along the entire segment is clear with many small cascading waterfalls that range in height from a few feet to nine feet. Pools range from very shallow to a depth of ten feet. There are two pools that were at least 34-by-40 inches and one gorge, or series of connected narrow pools that stretched for about 70 yards or more in length. The water is very clear and appears to be unpolluted.

The combination of color along the creek is limited to a variety of greens in the vegetation, gray rock, a few red/pink rocks and boulders, and the color of the water in the pools vary from emerald green to green-blue. In the fall the big-leaf and vine maples are yellows, oranges, and reds.

Big Windy Creek is a prime example of a wilderness creek that has had minimal, if any, human-caused disturbance. Any human-caused disturbances have been mitigated by time and are no longer evident.

### Eligibility Determination

The entire segment was found to be free flowing and have three outstandingly remarkable values: scenery, recreation, and wildlife.

**Scenery:** The scenery outside the narrow riparian zone was difficult to see due to the steepness of the creek canyon and the dense vegetative cover and canopy. The area appears to be completely undisturbed and roadless. Ridges can be seen in the distance and appear to be uncut. This adds to the feeling of isolation and wilderness.

**Recreation:** There is no evidence of human activity anywhere along the surveyed portion of the creek. The area is roadless except for roads at the extreme upper reaches of the creek. The terrain is very steep. There are no trails. The probability of human encounter is very low. The area gives one a feeling of wilderness and solitude. Fishing and wildlife watching are also possible.

**Wildlife:** Many fish of varying sizes inhabit the creek. The fish ranged from a few inches to 12 to 13 inches. In one pool, there were approximately 20 fish that ranged in size from 8 to 9 inches. The creek is good fish habitat with many of the pools having sand or gravel bottoms or bars that would be suitable for spawning. Due to the many falls and cascades it is thought fish could only migrate upstream during periods of high water.

There were many signs of wildlife throughout the riparian zone. Crayfish, frogs, and toads were seen in the creek. Raccoon tracks were found along many different stretches and deer tracks were frequently seen throughout the area. Bear scat was observed in several places. A single kingfisher and several pair of water ouzels were sighted.

This suitability assessment was prepared based on these findings and BLM's 100 percent administrative jurisdiction within the one-half mile river corridor.

### Classification Determination

The river's highest potential classification is Wild. The river is free of any impoundments, diversions, or streambank modifications. There is no shoreline development. There is no logging activity adjacent to the creek. Water quality and quantity is excellent and supports the river corridor's outstandingly remarkable values.

Big Windy Creek is accessible by foot only. There are no developed trails.

#### Potential Classification Summary

Activity	Wild	Scenic	Recreational
Water resources development	M	M	E
Shoreline development	M	E	E
Water quality	M	E	E
Accessibility	M	E	E

M: Meets

DM: Does not meet

E: Exceeds

### Suitability Factors

#### Current Land Status and Use

#### Land Ownership

The Medford BLM District administers 6.8 stream frontage miles (both sides included) which is 100 percent of the suitable river segment as shown.



## Segment Ownership and Status Within the Creek Corridor

Ownership	Acres	Percent
BLM		
Public Domain	2,080	100
O&C lands		
Forest Service		
State		
County		
Timber co.		
Private individuals		
Total	2,080	100

## Land Use

Land use within the one-half mile river corridor are varied.

There is no timber harvesting on public lands. Livestock grazing and agricultural activities do not occur within the river corridor. There are no private land residential developments within the river corridor. There are no undeveloped lots zoned for residential development. There are no mining claims located within the river corridor and no federal mineral leases are in effect.

Josephine County has zoned the corridor as Forest Commercial.

## Reasonable Foreseeable Uses of the Land and Water Which Would be Affected By Designation

Appendix 2-WS-2, Draft RMP, provides a general description of land uses and management practices appropriate for wild, scenic, and recreational river areas. Consequences by plan alternative are displayed in Table 4-WS-1.

## Uses That Would Be Enhanced by Designation

Current and potential uses on BLM-administered lands are expected to be compatible with a recreational river classification. With the highest potential classification of wild, the visual resource management would be more restrictive.

Designation as Wild would lead to VRM Class I (VRM Class II if scenic or recreational) management of BLM-administered land in the 1/2-mile river corridor,

protecting and enhancing its scenic value and wildlife habitat value, and thus, indirectly its recreational use. It is possible that the application of a higher water quality standard due to its designation would require more careful timing of BLM timber sales in the watershed. If the river were designated as recreational, BLM management would be similar in most respects to management without designation, but BLM's management presence would increase, diminishing inappropriate uses and thus enhancing the river segment's recreational use.

## Uses That Would Be Foreclosed By Designation

Designation as Wild could lead to imposition of county zoning restrictions on currently subdivided but undeveloped lands or to federal efforts to acquire scenic easements limiting development on such lands, foreclosing some development options.

## Uses That Would Be Curtailed By Designation

Designation as Wild would lead to VRM Class I management of BLM-administered lands in the 1/2-mile corridor, eliminating timber management on those lands and diminishing the rate of timber harvest from them. Designation as either wild, scenic, or recreational would lead to application of a higher water quality standard, requiring more careful timing of BLM timber sales in the upstream watershed which could also diminish the rate of timber harvest but on a larger area.

## Hydroelectric Potential

The potential hydroelectric power available in any stream reach is determined by the formula:  $P=cQH_e$  where:

$P$  = power (kilowatts)  
 $c$  = conversion factor = 0.08475  
 $Q$  = streamflow (ft<sup>3</sup>/sec)  
 $H$  = head (feet)  
 $e$  = efficiency = 1.0

Using data contained in the Oregon State University's Water Resources Research Institute's 1979 study entitled, "A resource Survey of Low-Head Hydroelectric Power Potential in Oregon," the theoretical hydroelectric power potential for this segment of Big Windy Creek would be:

$P = (0.08475) (Q=30) (H=3,000) (1.0) = 7,627$  kilowatts

There is no Federal Energy Regulatory Commission (FERC) application, irrigation, or other proposals for dams or diversions on file for this river segment.

### **Effect on Outstandingly Remarkable Values**

## **Those Enhanced if River Segment Were Designated**

Designation would ensure the continued availability of recreation opportunities occurring in this river segment including hiking, sightseeing and swimming. Other recreation uses occurring in the area such as picnicking, wildlife observation, nature photography, and camping would also continue to be available. Designation would enhance wildlife populations by helping to preserve existing habitat. Management of riparian areas would provide appropriate protection of fisheries habitat.

## **Those Diminished if River Segment Were Not Designated**

Recreation opportunities would not be provided long-term protection afforded by designation. Management of these opportunities as specified in the PRMP would not include any development of access or other facilities. Continued increases in recreation use would lead to more crowding, littering, vandalism, and environmental damage.

### **How the River Segment Would Be Managed if It Were Not Designated or if Designated at a Lower Classification**

If the river were not added to the National Wild and Scenic Rivers System BLM would manage land under its jurisdiction within the one-half mile corridor for protection of the riparian values and for continuation of existing levels of use within the corridor. The outstandingly remarkable values of wildlife, fish, and recreation would have some level of protection by such management. Lands in the 1/2-mile corridor but outside the riparian zone would be subject to timber harvest and would be managed under VRM Class III standards. This could diminish the scenic attributes of the river corridor.

If the river were added to the system but designated as recreational, management would be similar to that if it were not designated. Increased public use due to its higher visibility could require more management of recreational use.

## **Cost of Administration**

The basic objective of wild and scenic river designation is to maintain the river's existing condition. If a land use or development clearly threatens the outstandingly remarkable values which resulted in the rivers' designation, efforts will be made to remove the threat through local zoning, State Scenic Waterway Act provisions, land exchanges, purchases from willing sellers, and other actions short of condemnation. In the event condemnation becomes necessary, the only landowner rights which will be purchased are those necessary to remove the threat to the specific river value.

Any actual or potential threat to a rivers outstandingly remarkable values, together with specific options to remove or mitigate that threat, can only be determined on a case-by-case basis. Because of variable river values, possible threats and protection mechanisms, estimated costs of acquiring necessary lands or interests in lands will be made in the river study report for rivers determined suitable and subsequently recommended for designation and/or in the river management plan required to be completed within three full fiscal years of designation.

The estimated cost of preparing a required river management plan for this stream segment would be \$30-40,000. Annual river management, administration, and monitoring costs are estimated to be \$3-6,000. Cost estimates for resource protection measures and necessary public use facilities would be determined through the river management planning process.

No state or local agency has come forward and stated they would be willing to share in the cost of administering this river segment should it become part of the system. In light of the financial constraints imposed by Oregon ballot "Measure 5," it is unlikely that state or local agencies would share in these costs.

## **Administering Agency**

If Big Windy Creek were added to the National Wild and Scenic Rivers System, the BLM would continue to manage the land and resources it currently administers.

## **Finding and Rationale**

### **Finding**

The 6.8-mile segment of Big Windy Creek from the headwaters of Big Windy Creek in T.34S., R.9W., Section 7, SW1/4, to confluence with the Rogue River is found suitable for Federal designation as a wild river under the Wild and Scenic Rivers Act.

### Characteristics Which Do or Do Not Make the Area a Worthy Addition to the System

The 100 percent majority of federal ownership within one-half mile corridor of this segment and the presence of three outstandingly remarkable values would make this a meaningful addition to the national system. This creeks outstandingly remarkable values are distinctive but similar to other creeks in the Rogue Valley. The wildlife outstandingly remarkable values, while somewhat common in the region, enhances the other values in the study segment. Management to a less restrictive standard would probably lead to a decline in the river's outstandingly remarkable values.

Designation as wild, scenic, or recreational under the Act could cause a slight loss in employment and slightly restrict private landowners. The greatest positive effect from designation as scenic would be the long-term protection of the outstandingly remarkable values within the river segment. The greatest negative effect would be the restriction on new land uses, developments, and activities that could, if allowed, negatively affect the outstandingly remarkable values.

Although Big Windy Creek is distinctive it can be considered similar to other creeks in the Rogue Valley. However, the character of all "Wild" creeks, while seemingly abundant at present is slowly being changed by the intrusions of man in the form of logging, mining, and other development activities. It is important that some of these creeks be preserved in an undeveloped state for the enjoyment of future generations. The designation of this creek under the National Wild and Scenic Rivers Act is one way to ensure its continued protection.

In addition, the protection of this creek, which is tributary to the Rogue Wild and Scenic River, will help protect the integrity of the outstandingly remarkable values that caused the Rogue to be designated.

## Howard Creek

### Summary

The 7-mile segment of Howard Creek is found suitable for designation as a Wild river under the National Wild and Scenic Rivers Act.

### Background

#### Description of the River

The Medford District identified as eligible a 7-mile segment of Howard Creek described as headwaters of Howard Creek in T.35S., R.9W., Section 1, NE1/4 to confluence with Rogue River (see Maps T.34S., R.8W., T.34S., R.9w., and T.35S., R.9W).

This entire stretch is a very steep country with very rough terrain. The canyon walls range from 40 percent to vertical with cliffs and rock out-cropping. In many places the creek bed is carved out of solid rock, forming pools and gorges of sheer rock with rock and gravel bottoms.

Howard Creek has a very narrow riparian zone with the associated diversity of vegetation including but not limited to alder trees, ash trees, big-leaf maples, vine maples, evergreen ferns, monkey-flowers, etc. There are also a few populations of yew. Above the riparian zone on the hillsides and cliffs there were tan oaks, canyon live oaks, and huckleberry.

Water along the entire segment is clear with many small cascading waterfalls that range in height from a few feet to 12 feet. Pools range from very shallow to a depth of 15 feet. The water is very clear and appears to be unpolluted.

One cave was located about 10 feet above the creek overlooking a significant waterfall. The cave is 12 feet deep.

The combination of color along the creek was limited to a variety of greens in the vegetation, gray rock, with a few red/pink rocks and boulders and the color of the water in the pools varied from emerald green to a green/blue color. In the fall season the big-leaf and vine maples are yellow, orange, and red color.



Howard Creek is a prime example of a wilderness creek that has had minimal, if any, human-caused disturbance. Any human-caused disturbances have been mitigated by time and are no longer evident.

### Eligibility Determination

The entire segment was found to be free flowing and have three outstandingly remarkable values: scenery, recreation, and wildlife.

**Scenery:** The scenery outside the narrow riparian zone was difficult to see due to the steepness of the creek canyon and the dense vegetative cover and canopy. The area appears to be completely undisturbed and roadless. Ridges can be seen in the distance and they all appear to be uncut. This adds to the feeling of isolation and wilderness.

**Recreation:** There is no evidence of human activity along the portion of the creek that was surveyed. The area is roadless except for roads at the extreme upper reaches of the creek. The terrain is very steep and difficult. There are no trails. The probability of human encounter is very low. The area definitely gives one a feeling of wilderness and solitude. Fishing and wildlife watching are also possible.

**Wildlife:** There were many fish of varying sizes sighted in the creek. The fish ranged from a few inches to 12 to 13 inches. The creek is good fish habitat with many of the pools having sand or gravel bottoms or bars that would be suitable for spawning. Because of the many falls and cascades, we believe that fish could only migrate upstream during high water.

There were many signs of wildlife throughout the riparian zone. Crayfish, frogs, and toads were seen in the creek. Raccoon tracks were found along many different stretches. Deer tracks were seen frequently throughout the area. Bear scat was observed in several places. A single kingfisher and several pair of water ouzels were sighted.

This suitability assessment was prepared based on this finding and BLM's 100 percent administrative jurisdiction within the one-half mile river corridor.

### Classification Determination

The river's highest potential classification is Wild as shown. The river is free of any impoundments, diversions, or streambank modifications. There is no shoreline development. There is no logging activity adjacent to the creek. Water quality and quantity is

excellent and supports the river corridor's outstandingly remarkable values.

### Potential Classification Summary

Activity	Wild	Scenic	Recreational
Water resources development	M	M	E
Shoreline development	M	E	E
Water quality	M	E	E
Accessibility	M	E	E

M: Meets

DM: Does not meet

E: Exceeds

Howard Creek is accessible by foot only. There are no developed trails.

### Suitability Factors

### Current Land Status and Use Land Ownership

The Medford District administers 7.0 stream frontage miles (both sides included) which is 100 percent of the suitable river segment as shown.

### Segment Ownership and Status Within the Creek Corridor

Ownership	Acres	Percent
BLM		
Public Domain	2,080	100
O&C lands		
Forest Service		
State		
County		
Timber co.		
Private individuals		
Total	2,080	100

### Land Use

Land use within the one-half mile river corridor are varied. There is no timber harvesting on public lands. Livestock grazing and agricultural activities do not occur within the river corridor. There are no private land residential developments within the river corridor. There are no undeveloped lots zoned for residential development.

## Appendix J

Josephine County has zoned the corridor as Forest Commercial.

There are 26 mining claims located within the river corridor and no federal mineral leases are in effect.

### Reasonable Foreseeable Uses of the Land and Water Which Would be Affected By Designation

Appendix 2-WS-2, Draft RMP, provides a general description of land uses and management practices appropriate for wild, scenic, and recreational river areas. Consequences by plan alternative are displayed in Table 4-WS-1.

#### Uses That Would Be Enhanced by Designation

Current and potential uses on BLM-administered lands are expected to be compatible with a recreational river classification. With the highest potential classification Wild, the visual resource management would be more restrictive.

Designation as Wild would lead to VRM Class I (VRM Class II if scenic or recreational) management of BLM-administered land in the 1/2-mile river corridor, protecting and enhancing its scenic value and wildlife habitat value and thus indirectly its recreational use. It is possible that the application of a higher water quality standard due to its designation would require more careful timing of BLM timber sales in the watershed. If the river were designated as recreational, BLM management would be similar in most respects to management without designation but BLM's management presence would increase, diminishing inappropriate uses and thus enhancing the river segment's recreational use.

#### Uses That Would Be Foreclosed By Designation

Designation as wild or scenic could lead to imposition of county zoning restrictions on currently subdivided but undeveloped lands or to federal efforts to acquire scenic easements limiting development on such lands, foreclosing some development options.

#### Uses That Would Be Curtailed By Designation

Designation as wild would lead to VRM Class I management of BLM-administered lands in the 1/2-mile corridor, eliminating timber management on those lands and diminishing the rate of timber harvest from them. Designation as either wild, scenic, or recreational would lead to application of a higher water quality standard, requiring more careful timing of BLM timber sales in the upstream watershed which could also diminish the rate of timber harvest, but on a larger area.

### Hydroelectric Potential

The potential hydroelectric power available in any stream reach is determined by the formula:  $P = cQH_e$  where:

$P$  = power (kilowatts)  
 $c$  = conversion factor = 0.08475  
 $Q$  = streamflow (ft<sup>3</sup>/sec)  
 $H$  = head (feet)  
 $e$  = efficiency = 1.0

Using data contained in the Oregon State University's Water Resources Research Institute's 1979 study entitled, "A resource Survey of Low-Head Hydroelectric Power Potential in Oregon," the theoretical hydroelectric power potential for this segment of Howard Creek would be:

$P = (0.08475) (Q=30) (H=3,000) (1.0) = 7,627$  kilowatts

There is no Federal Energy Regulatory Commission (FERC) application, irrigation, or other proposals for dams or diversions on file for this river segment.

### Effect on Outstandingly Remarkable Values

#### Those Enhanced if River Segment Were Designated

Designation would ensure the continued availability of recreation opportunities occurring in this river segment including hiking, sightseeing and swimming. Other recreation uses occurring in the area such as picnicking, wildlife observation, nature photography, and camping would also continue to be available. Designation would enhance wildlife populations by helping to preserve existing habitat. Management of riparian areas would provide appropriate protection of fisheries habitat.

### **Those Diminished if River Segment Were Not Designated**

Recreation opportunities would not be provided long-term protection afforded by designation. Management of these opportunities as specified in the PRMP would not include any development of access or other facilities. Continued increases in recreation use would lead to more crowding, littering, vandalism, and environmental damage.

### **How the River Segment Would Be Managed if it Were Not Designated or if Designated at a Lower Classification**

If the river were not added to the National Wild and Scenic Rivers System, the BLM would manage land under its jurisdiction within the one-half mile corridor for protection of the riparian values and for continuation of existing levels of use within the corridor. The outstandingly remarkable values of wildlife, fish, and recreation would have some level of protection by such management. Lands in the 1/2-mile corridor but outside the riparian zone would be subject to timber harvest and would be managed under VRM Class III standards. This could diminish the scenic attributes of the river corridor.

If the river were added to the system but designated as Recreational, management would be similar to that if it were not designated. Increased public use due to its higher visibility could require more management of recreational use.

### **Cost of Administration**

The basic objective of wild and scenic river designation is to maintain the river's existing condition. If a land use or development clearly threatens the outstandingly remarkable values which resulted in the river's designation, efforts will be made to remove the threat through local zoning, State Scenic Waterway Act provisions, land exchanges, purchases from willing sellers, and other actions short of condemnation. In the event condemnation becomes necessary, the only landowner rights which will be purchased are those necessary to remove the threat to the specific river value.

Any actual or potential threat to a river's outstandingly remarkable values, together with specific options to remove or mitigate that threat, can only be determined on a case-by-case basis. Because of variable river values, possible threats and protection mechanisms, estimated costs of acquiring necessary

lands or interests in lands will be made in the river study report for rivers determined suitable and subsequently recommended for designation and/or in the river management plan required to be completed within three full fiscal years of designation.

The estimated cost of preparing a required river management plan for this stream segment would be \$30-40,000. Annual river management, administration, and monitoring costs are estimated to be \$3-6,000. Cost estimates for resource protection measures and necessary public use facilities would be determined through the river management planning process.

No state or local agency has come forward and stated they would be willing to share in the cost of administering this river segment should it become part of the system. In light of the financial constraints imposed by Oregon ballot "Measure 5," it is unlikely that state or local agencies would share in these costs.

### **Administering Agency**

If Howard Creek were added to the National Wild and Scenic Rivers System, the BLM would continue to manage the land and resources it currently administers.

### **Finding and Rationale**

#### **Finding**

The 7-mile segment of Howard Creek from the headwaters of Howard Creek in T.35S., R.9W., Section 1, NE1/4, to confluence with the Rogue River is found suitable for Federal designation as a wild river under the National Wild and Scenic Rivers Act.

### **Characteristics Which Do or Do Not Make the Area a Worthy Addition to the System**

The 100 percent majority of federal ownership within one-half mile corridor of this segment and the presence of three outstandingly remarkable values would make this a meaningful addition to the national system. This creek's outstandingly remarkable values are distinctive but similar to other creeks in the Rogue Valley. The wildlife outstandingly remarkable value, while somewhat common in the region, enhances the other values in the study segment. Management to a less restrictive standard would probably lead to a decline in the river's outstandingly remarkable values.

Designation as wild, scenic or recreational under the Act could cause a slight loss in employment and slightly restrict private landowners. The greatest positive effect from designation as scenic would be the long-term protection of the outstandingly remarkable values within the river segment. The greatest negative effect would be the restriction on new land uses, developments, and activities that could, if allowed, negatively affect the outstandingly remarkable values.

Although Howard Creek is distinctive it can be considered similar to a few other creeks in the Rogue Valley. However, the character of all "wild" creeks while seemingly abundant at present is slowly being changed by the intrusions of man in the form of logging, mining, and other development activities. It is

important that some of these creeks be preserved in an undeveloped state for the enjoyment of future generations. The designation of this creek under the Wild and Scenic Rivers Act is one way to ensure its continued protection.

In addition, the protection of this creek, which is tributary to the Rogue Wild and Scenic River, will help protect the integrity of the outstandingly remarkable values that caused the Rogue River to be designated.

Each of the following 32 suitability assessments contain a summary which identifies the river segment and the findings followed by a more detailed description of the river and other factors considered in the suitability determination.

Table WSR-1. Ranking of Outstandingly Remarkable Values in Region 9

River Segment	Rec.	Geol.	Fish	Wildlife	Scnc.	Cult.	Hist.	Other <sup>1</sup>
Rogue <sup>2</sup>	X		X	X	X		X	
Illinois	X		X		X			X
Klamath <sup>3</sup>	X		X	X	X	X	X	X
North Umpqua <sup>2</sup>	X		X		X			X
Upper Rogue <sup>2</sup>	X		X					X
Whiskey Creek (to east and north forks)							X	
Antelope Creek (Segments A & C)					X			

<sup>1</sup>Other (Water quality, hydrological, botanical, vegetation, ecological, biological diversity).

<sup>2</sup>River segments previously designated.

<sup>3</sup>Segment 2 of the upper Klamath ranks in the top 1 or 2 rivers for cultural, historic, and other outstandingly remarkable values.

# Appendix K

## Silvicultural Systems Utilized in the Design of the Proposed Resource Management Plan

In addition to dealing with land use allocations and objectives, the resource management plan (RMP) deals with the selection of and effects of different silvicultural systems and the practices used to carry out those systems.

A silvicultural system defines the sequence of management treatments that take place throughout the entire life of a forest stand. A system is designed to move a stand from its current condition along a developmental path toward a desired or target stand condition. The target stand and the attributes of the path are defined by an array of management objectives.

In the design of the proposed action, a variety of general silvicultural systems are used for the different Land Use Allocations. Differences between systems are the result of differences in resource objectives and differences in forest condition and ecological types. Reforestation or the establishment of desired vegetation is the critical part of any silvicultural system.

Silvicultural systems are resource and objective neutral. They are designed to meet a wide range of management goals that include: timber production; creation or maintenance of wildlife habitat; restoration of forest condition (health); maintenance or restoration of riparian condition; reclamation of mines, quarries, and roads; management of right of way vegetation; and maintenance or improvement of site productivity. The descriptions of silvicultural systems, therefore, are not included with any one resource category.

### Silvicultural System Design

Silvicultural systems as well as individual management actions will be designed to:

- meet established land use objectives;
- maintain the health and sustainability of forest ecosystems and their processes or to restore

forest condition so that management objectives can be met;

- incorporate current and developing knowledge of natural processes and the relationships between structures, landscape arrangements, and the maintenance of ecosystem function;
- involve landscape level (watershed) analysis at a variety of spatial and temporal scales; and
- consider the elements of ecosystem and landscape function, composition, and structure.

Silvicultural system design will vary from site to site and will be based on:

- consideration of stand vigor, disease, live crown ratio, and general stand condition;
- the autecological and synecological requirements of major or indicator plant and animal species and species groups;
- habitat requirements of rare or endangered species;
- requirements of avoidance (prevention) strategies for vegetation management;
- economic feasibility; and
- soil, slope, aspect, and other physical site conditions that influence reforestation potential, blowdown potential, or that otherwise influence the ability of prescribed treatments to meet target stand and landscape objectives.

Simply stated, silvicultural systems and activities should be based on the objectives of the land allocation, ecological processes, site and stand characteristics, and economic feasibility within a framework of landscape analysis.

Best management practices (BMPs) for water and soil resources (see Appendix F) would be used in designing site-specific silvicultural prescriptions consistent with the objectives of the LUA.



Where appropriate, silvicultural systems and individual management actions will be adapted to meet the requirements of experimental designs that permit the agency and its publics to explore the results of the application of a range of alternative management options to both stands and landscapes. Where not in direct conflict with LUA objectives, silvicultural systems would be designed to assure that resultant wood quality is suitable for the range of current and forecasted uses and that they would maintain or enhance log value.

## Objectives, Habitat Criteria, and Management Practices Design for the Land Use Allocations

The description of the proposed action involves three separate criteria for each Land Use Allocation. These criteria are:

- A) resource condition objectives that summarize and highlight the important resource management goals for the LUA for the next decade,
- B) stand and landscape condition objectives that are desired in the near future and in the longer term, and
- C) management direction which set sideboards for stand and landscape composition.

Management direction described in this appendix incorporates "Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl."

## Silvicultural Systems

Silvicultural systems utilized in the design of the proposed action include modified even-aged, shelterwood retention, and structural retention systems.

### Modified Even-Aged Silvicultural Systems

Modified even-aged systems involve the management of both existing even-aged or near

even-aged stands and the creation of new even-aged stands through harvesting while retaining both living and dead structural elements (green trees, snags, coarse woody debris). Retained structure is at levels below those detailed for structural retention systems.

## Stand Regeneration

Stand regeneration methods under this category of silvicultural systems include modified versions of the seed tree, shelterwood, and overstory removal harvest methods. Stands remaining after final harvest will generally resemble reserve seed tree cuts. These systems harvest the majority of the stand in a single entry and permit the establishment of an even-aged stand with the fewest number of entries while retaining wildlife trees and snags. Regeneration is usually through planting following site preparation, although in southwestern Oregon there are sometimes significant quantities of advanced regeneration remaining after logging. Natural regeneration may occur through seed dispersed from retained trees or trees in adjacent timber stands. In southwestern Oregon, units harvested in this manner could require actions in addition to conifer planting to secure regeneration. These actions include seedling shading, protection from animal damage, and control of competing vegetation.

The reserved seed tree method of harvest removes the majority of a stand in a single entry except for a small number of green, seed trees that are retained to provide seed for natural regeneration, and under this plan provide biological legacies. If necessary, artificial regeneration, usually planting, would be used to reach target stocking levels. Genetically-selected stock would be used when available.

In a shelterwood method, a stand is harvested in a series of two or more partial cut entries designed to create the necessary level of disturbance and to provide shelter for the establishment of newly planted and natural seedlings. After establishment of regeneration, overstory trees that are in excess of desired levels of wildlife trees and snags would be removed. While shelterwood units are typically planted with conifer species, natural regeneration may constitute a large percentage of the regeneration present.

Forest stands in southwestern Oregon are often multiple-aged with different canopy levels resulting from past natural stand disturbances such as under-canopy fires or from past partial cut harvesting. In these stands, an understory canopy level often exists and is capable of being released. This understory

canopy level may consist of seedlings, saplings, or young merchantable timber. The release and subsequent management of the understory canopy could result in a yield increase when compared to growing a new stand after a more complete stand removal. The decision to remove an overstory canopy considers the releasability and species composition of the understory canopy and the feasibility of logging the stand without significant damage to the understory. In some cases, retention of understory species could result in an undesirable seral shift, a higher level of disease in stands, and a potential loss of stand health.

## Stand Management

Following the regeneration phase, modified even-aged systems are treated to produce desired stand conditions that include wood of desired quality, quantity, and value. Modified even-aged systems may be managed at different levels of intensity. In the Medford District, stands on more productive sites are planned for a higher level of management intensity than stands on lower sites.

Stand management practices include control of species composition and stand density. Release practices are employed to ensure tree growth is not slowed by competing, undesirable plants and that desired trees are not displaced. Density control through thinning assures that cubic foot volume growth is concentrated in the stems of selected trees.

On more productive sites, forest fertilization may be employed to temporarily increase stand growth. Some young stands in the planning area are in poor condition because of high densities or because of overstory competition. Stands may experience significant growth retardation called thinning shock following precommercial thinning, overstory removal, or release. The severity of this retardation may be reduced through the application of fertilizer. In addition, forest fertilization may be used to improve tree vigor and to reduce insect and drought related mortality.

## Stand Harvesting

Stand harvesting may occur at any age above a minimum harvest age set to meet land use objectives as well as economic and logging-practicality requirements.

The sustainable harvest level is highest if minimum harvest age is set at the lowest economically

practical age. Over time, however, rotation lengths would approach the age of culmination of mean annual increment (CMAI). CMAI varies with site quality, the kinds of silvicultural practices employed, and the timing of those practices. For most regimes and sites in southwestern Oregon, CMAI occurs near 100 years of age.

To achieve higher wood quality, larger log sizes, or to produce habitat for species that live in later seral stages, minimum harvest age may be set at an older age.

## Shelterwood Retention Silvicultural Systems

Shelterwood retention refers to modified even-aged systems that have sometimes been termed "irregular shelterwoods." In these systems, overstory trees are retained (in addition to desired living and dead structural elements) until understory conifers are large enough to fulfill management objectives such as preserving visual qualities, maintaining the integrity of specific soils, and establishing regeneration in areas with growing-season frosts. Depending upon objectives, overstory trees may be retained for 15 to 30 years. Retention of an overstory may not be successful in some areas, such as those infected with diseases or root rot and those of high blowdown hazard. A wide variety of stand conditions exist across the planning area.

## Stand Regeneration

Shelterwood retention units are normally planted, but like shelterwoods, also receive varying amounts of natural regeneration. Planting stock would reflect genetic selection when such stock is available, but since the performance of genetic stock and percent representation in stands created under these regimes are uncertain, no yield gain would be claimed for this action.

## Stand Management

Like other silvicultural systems, shelterwood retention stands receive treatments designed to produce desired stand characteristics. To produce economically-harvestable tree sizes in reasonable periods of time, control of species composition and stand density are as critical or more critical in shelterwood retention systems than in modified even-aged systems. Fertilization may be applied to

accelerate stand development and to reduce shock and damage following overstory removal.

## Stand Harvesting

Harvest of retained shelterwood trees (in excess of desired green-trees and snags) occurs in one or more entries 15 to 30 years after the regeneration harvest and when stand development has reached a point where visual, soil, or frost-tolerance requirements have been met.

## Structural Retention Systems

These silvicultural systems are designed primarily to retain or recreate forest ecosystems that resemble natural systems in composition, structure, and in ecosystem function. Retained structural components include green-trees, snags, and coarse woody debris that may be clumped or distributed in various ways across the landscape. Through retention and re-creation of structure and through appropriate selection and timing of treatments, these systems attempt to retain natural ecosystem processes and habitat niches. Structural retention systems attempt to provide for maintenance of site productivity, specific wildlife habitats, and a high level of biological diversity in a managed landscape.

Silvicultural practices used are modifications of those used in modified even-aged systems but reflect a greater attempt to redirect ecosystem processes.

Structural retention systems would usually produce a multiple-canopied, multiple-aged stand but not an all-aged stand. These systems differ in some ways from selection forestry, although many elements of selection cutting are included such as removal of individual trees (individual tree selection) or groups of trees (group selection). The objective of structural retention systems is to produce a multiple-canopied forest, not necessarily one of all ages.

## Stand Regeneration

The regeneration phase of this system relies upon the use of both natural and planted conifer seedlings, together which subsequent stand management, to achieve a near-natural mixture of species in each seral stage. Stock reflecting genetic selection,

whenever available, would be combined with wild-type stock. No yield increase for use of selected stock would be projected.

## Stand Management

Stands created under this system receive treatments designed to meet structural, functional, and growth objectives. Density management would be used. Forest fertilization would be used as appropriate, but because of the uncertainty of its effect on diverse stands, it would not result in a claimed yield increase.

## Stand Harvesting

Structural retention systems seek to retain or re-create habitat characteristics of older forests. Harvesting is expected to occur across stands and in group selections of varying sizes with structures retained in the groups.

## Silvicultural Practices

Each silvicultural system is comprised of a variety of practices that are planned for specific periods in the life of the stand. These practices act to keep forest stands on desired developmental trajectories, speed the development of desired habitat components, and maintain or improve stand vigor. Silvicultural practices in this region have traditionally been applied to conifer stands and their development, however, many of the same principles and treatments have application for the growth and development of other desired vegetation.

While both the types of practices used and the timing vary between systems, most silvicultural systems require the full range of forest management tools and practices for their successful implementation. To predictably direct forest stands (ecosystems) so that structural and other objectives are met may require some level of intensive stand tending practices whatever the system employed.

Silvicultural practices include: site preparation, conifer regeneration, stand protection, stand maintenance, precommercial thinning and release, commercial thinning, fertilization, pruning, forest condition restoration treatments, and salvage. Reforestation includes the full range of silvicultural practices necessary to establish and maintain stands on forestland.



## Site Preparation

If needed, site preparation procedures would be used to prepare newly harvested or inadequately stocked areas for planting, seeding, or natural regeneration. Site preparation methods would be selected to: provide physical access to planting sites; control fire hazard; provide initial physical control of the site to channel limited resources on the site into desired vegetation; influence the plant community that redevelops on the site; influence or control animal populations; and ensure the retention of site productivity.

Within the planning area, four types of site preparation techniques would be used. These are prescribed burning, mechanical and manual methods, and herbicide application.

Prescribed burning, including broadcast and pile burns, is expected to be the primary method of site preparation. To protect air quality, burning would occur under conditions consistent with the Oregon Smoke Management Plan. Burning prescriptions will be written to minimize the detrimental effects of fire on other resources. Emphasis will be placed on protecting soil properties and the retention of coarse woody debris. Prescribed fire on sensitive soils will be designed to result in low to moderate intensity burns (see Best Management Practices, Appendix F).

Mechanical site preparation consists of either tractor piling or windrowing of slash and unwanted vegetation or the use of a low ground pressure backhoe, loader, grapple, or other special equipment to move or pile slash and unwanted vegetation.

Manual site preparation consists of slash piling, shrub pulling or cutting, and hoeing or grubbing of unwanted vegetation.

Application of herbicides for site preparation purposes would occur only after careful site-specific environmental analysis and local public involvement. Decision for use would be governed by the procedures established in BLM's Record of Decision (ROD) Western Oregon Program-Management of Competing Vegetation.

## Conifer Regeneration — Establishment of Non-Conifer Plant Species

Conifer planting would be done where appropriate to assure that reforestation objectives are promptly met. The production of planting stock requires seed (cone) collection from wild stands and/or from seed orchards and the production of planting stock in bare-root nurseries or container shadehouses.

The release and management of existing natural conifer regeneration has the potential to speed stand development. Natural conifer regeneration can, in many situations, be both adequate and relatively prompt (Lewis et. al. 1991) and of species appropriate to meet stand objectives (Williamson 1973). Relying on natural regeneration, however, results in the loss of the ability to use genetically-selected stock and the potential for delayed regeneration due to the unpredictability of seedfall. When applicable, silvicultural systems would utilize existing regeneration, natural seeding, and prompt planting of desired species to assure that regeneration targets and timeframes are met. No yield increase was assumed as a result of retention of existing regeneration following regeneration harvest or overstory removal.

Existing vegetation would be used to the extent possible in meeting management objectives dependant upon nonconiferous vegetation. Where necessary to meet objectives, nonconifer vegetation would be established through seeding or the planting of bare-root or containerized plants.

## Stand Protection

Stand protection procedures would be designed to protect newly planted conifer seedlings and in some cases natural seedlings from hazards. Treatments are designed to protect seedlings from the sun or to prevent animal damage from occurring. Measures to control populations of animals such as mountain beaver, gophers, or porcupines would be initiated if populations of these animals reached levels high enough to threaten stands. Treatment acres will be determined annually in conjunction with reforestation surveys.

Similar treatments would be used when appropriate to protect planted or seeded nonconiferous vegetation.

Stands will also be managed to decrease the risk of destruction by wildfire. Management practices include treatments such as underburning, limbing, density management, or hand piling or utilization of slash. Creation of fuel breaks, especially in rural interface areas, would be a method of decreasing risks. Retention of a hardwood component in stands may result in somewhat higher level of resistance to low intensity fires.

## Stand Maintenance

Maintenance treatments occur after planting or seeding and are designed to promote the survival and establishment of conifers and other vegetation by reducing competition from undesired plant species. Maintenance and other vegetation management actions would be planned so that in addition to survival goals, species diversity goals could be met.

Maintenance actions involve the implementation of preventive (or ecosystem-based) strategies or direct control actions using techniques such as mulching, cutting or pulling of unwanted species, grazing, or herbicide application. As with other vegetation management treatments, preference for stand maintenance treatments would be given to strategies that redirect natural ecosystem processes where practical and where scientific knowledge was adequate to support such strategies. The choice between methods would be made under the same decision framework listed for site preparation.

## Precommercial Thinning — (Density Management) and Release

Precommercial thinning and release treatments would be designed to control stand density, influence species dominance, maintain stand vigor, and place stands on developmental paths so that desired stand characteristics result in the future. Thinning and release may occur simultaneously or separately.

Precommercial thinning and release treatments may be done either by manual methods such as falling or girdling or through herbicide application. Site specific decision-making processes for herbicide release treatments follow the same procedures as those listed for site preparation.

## Commercial Thinning (Density Management)

Commercial thinnings would be designed to control stand density, maintain stand vigor, and place or maintain stands on developmental paths so that desired stand characteristics result in the future. Commercial thinnings are scheduled after developing stands reach a combination of stem diameter and surplus volume to permit an entry that is economical. Commercial thinning may be effective in increasing recoverable timber production and in meeting structural diversity objectives in stands as old as 150 years (Williamson and Price 1971) (Williamson 1982). Heavy commercial thinning has shown the ability to accelerate the development of old growth characteristics in even-aged stands (Newton et. al. 1987).

## Fertilization

Stand growth is limited by the supply of available nutrients, particularly by available nitrogen. The supply of soil nutrients may be augmented through either fertilization or, in some situations, through retention of species and structural diversity in stands. Fertilization practices are designed based on extensive research, including work in southwestern Oregon. Fertilization actions are usually designed to apply 200 pounds of available nitrogen with helicopters in the form of urea-based prill (46 percent available nitrogen). Occasionally, fertilizer may be applied in a liquid urea-ammonia form or with a mixture of other nutrient elements in addition to nitrogen. Hand application is usually impractical. For optimum effectiveness, forest fertilization actions would be sequenced with thinning actions with preference given to young even-aged stands of site four and higher in the next decade.

Fertilization has the effect of accelerating stand and seral development. Since fertilizer increases the rate tree canopies expand and increase tree vigor, it has been observed to reduce thinning shock, accelerate release, and reduce susceptibility to damage from insects and drought.

## Pruning

Pruning of young stands is carried out to increase wood quality through the production of clear wood on rotations shorter than would be required without the action. Pruning helps to avoid production of wood with loose knots and yielding lumber, which is tight-

knotted but not necessarily clear. It is essential for the production of clear wood with grades above "common" under normal, even-aged rotations for Douglas-fir and pine (see Wood Quality, Appendix BB).

Pruning appears to be necessary to produce wood of acceptable quality from stands that are managed at very low densities to meet biological diversity objectives since trees in such stands would have long crowns and would produce wood with large knots otherwise.

## Salvage of Mortality Volume

All silvicultural systems provide for salvage under prescriptions designed to ensure that such actions meet the requirements of the land allocation. The manner in which salvage operations are conducted within a stand often influences or determines the silvicultural system and practices needed to achieve management objectives.

Mortality in established stands results either from competition and self-thinning or from disturbance events such as fire, windstorms, disease, or insect attack. Mortality associated with competition is generally harvested in commercial thinnings or is prevented through density management and species selection practices. Mortality of entire stands or of scattered trees that results from disturbance would be harvested in salvage operations. Only mortality above the level needed to meet snag retention and other habitat goals and provide desired levels of coarse woody debris would be harvested.

## Forest Condition Restoration Treatments

Forest condition restoration treatments are silvicultural treatments that are intended to reduce tree mortality and to restore the vigor, resiliency, and stability of forest stands that are necessary to achieve resource management objectives. These treatments include:

**Restoration thinning:** Reducing the density of forest stands with the objective(s) of increasing stand vigor, reducing mortality of desired stand components, and/or reducing susceptibility to insect and disease attack and spread.

**Understory reduction:** Partial or complete removal of one or more understory canopy layers (trees and/or shrubs) for the purpose(s) of maintaining desired

stand components and/or reducing the risk of stand replacement fire.

**Restoration underburning:** Use of fire for the specific purpose of reducing mortality of desired trees and improving stand vigor, resiliency, and stability. Hazard reduction is an incidental benefit.

**Plant community restoration:** Silvicultural actions, including planting, maintenance, and stand tending, designed to establish and maintain desired species (grasses, herbs, shrubs, etc.) within forest stands and to prevent the introduction of noxious weeds. Species composition can be a factor in insect and disease occurrence.

**Restoration fertilization:** Fertilization of forest stands, with nitrogen or with micronutrients, designed to minimize thinning shock after restoration thinning, to improve stand vigor, and/or to increase resistance to insect attack.

## Matrix

### Northern General Forest Management Area

The general prescription would be one of modified even-aged management. For areas where growing season frosts produce regeneration hazards, pyroclastic soils, and for most areas designed for VRM Class II management, the prescription would be one of shelterwood retention to provide a form of continuous canopy cover. Granitic and schist soils would be managed under structural retention guidelines. Silvicultural practices include the full range of practices consistent with LUA objectives. For features of Silvicultural Systems, see Table 2-21, "General Features of Silvicultural Systems - Proposed Action Medford District," for this and other allocations.

## Resource Condition Objectives

**Commodity Production:** Suitable commercial forestland would be managed to assure a high level of sustained timber productivity. Emphasis would be placed on use of intensive forest management practices and investments to maintain a high level of sustainable resource production while maintaining long-term site productivity, biological legacies (retained green-trees, snags, and coarse woody debris), and a biologically diverse forest matrix.

**Forest Condition (Forest Health):** Some stands in this allocation may not be in a condition to respond to treatments designed to meet management objectives. Management actions to improve forest condition include: density management, understory reduction operations that reduce competition, increased use of understory prescribed fire, and fertilization. It is expected that forest condition restoration treatments would occur primarily in the southern general forest management area (SGFMA).

**Habitat Retention, Restoration, and Production:** Manage fifth field watersheds so that a minimum of 15 percent of the federal forestland is in late successional condition. Selection of stands for management will involve consideration of the desired blend of seral stages and stand densities. Manage landscape planning blocks to maintain desired levels and distribution of early seral vegetation.

## Stand and Landscape Condition Objectives

**Target Stand Conditions:** Manage forests of the LUA so that over time landscapes would trend toward a forest composed of stands containing a variety of structures, stands containing trees of varying age and size, and stands with an assortment of canopy configurations. As stands age, within stand conditions should trend toward those characteristic of older forest types.

**Seral Composition:** Over time, manage for a balance of seral stages consistent with LUA objectives.

**Landscape Composition:** Manage toward a mix of stand conditions and seral patterns with consideration to three levels of scale: physiographic province (river basin / mountain range), landscape block (watershed), and within stand detail.

## Management Direction for Program Implementation

Variation by ecological type: Planning and implementation of specific projects will be based on an understanding of the ecological relationships and limitations of the plant communities proposed for management.

- **Douglas-fir series:** Regeneration patch sizes would vary to maintain pine and other species in the stand. Mistletoe and excessive madrone regeneration will require variation in prescriptions. Retention of canopy cover and careful choice of site preparation technique should be used to maintain deerbrush and grass at levels that do not prevent target stand conditions from being reached. Deerbrush and legumes should be retained in the system.
- **Tanoak series:** Highest district priority for use of prescribed fire. Patch sizes and retention prescriptions should consider the autecology of tanoak and reduce understory tanoak to more natural levels.
- **Hemlock and white fir series:** Management actions will consider requirements of site productivity or enhancement, including use of nitrogen fixing plants.
- **Qualifications of stands for management deferral:** Stands whose current level of large green-trees do not meet retention objectives would not be scheduled for regeneration harvests or overstory removals that removed those trees. Understory thinning and salvage of volume from these stands following partial or complete stand mortality would be permitted, provided structural objectives were met.

## Stand Structural and Species Composition:

**Structural Composition:** Maintain site productivity and wildlife habitat values through the retention of structure and the design of practices required to maintain ecosystem processes throughout the management cycle. For modified even-aged systems, retain on the average 6-8 large green trees per acre in harvest units. For shelterwood retention systems, retain 12-25 trees/acre until visual, soil, or frost requirements are met then reduce to 6-8 trees/acre. For structural retention systems, retain 16-25 trees/acre. Large conifers reserved would proportionally represent the total range of tree size classes greater than 20 inches in diameter and would represent all conifer species present. For specific standards and guidelines on coarse woody debris, green tree, and snag retention, refer to pages C-40 through C-44 of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted



Owl (sections entitled: "Provide specified amounts of coarse woody debris in matrix management," "Emphasize green-tree and snag retention in matrix management," "Standards and Guideline Specific to Northern Spotted Owl Habitat for Lands Administered by the Bureau of Land Management in Oregon," and "Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats"). In addition, a minimum of two large hardwoods, if present, would be retained per acre. Logging safety and potential tree mortality would be considered when determining the distribution of retained trees and snags.

**Species Composition:** Manage so that tree species trend over time toward Target Species Composition Objectives (see Table 1). Manage shrubs, forbs, and other vegetation consistent with LUA objectives.

## Landscape Design Elements

Manage so that continuous forest areas harvested through one or more treatments (i.e., group selections and dense-reserve patches interspersed within a thinning unit) will generally be between 20 and 120 acres in size. Retain dead and green structure within group selections consistent with meeting long-term stand composition goals. Situate harvest units to meet general landscape objectives, including minimizing fragmentation and providing general landscape connectivity. Harvest methods could vary within stand to: reflect current within-stand spatial patterns, meet stand objectives, and retain or create patches of reproductive or other habitat for key wildlife species.

## Regeneration Harvests

Regeneration harvests would not be programmed for stands under 100 years of age and generally would not be programmed for stands under 120 years of age within the next decade, unless required by deteriorating stand condition, disease, or other factors that threaten the integrity of the stand. Priority for harvest in stands under 120 years of age would be commercial thinning. Practices will be strongly influenced by consideration of ecological site potential, for retention of sufficient canopy to assure control of competing vegetation, and by factors including growing season frost potential.

## Commercial Thinning and Other Density Management

Stand densities would be maintained within desired ranges through a combination of planting density, precommercial thinning, commercial thinning, and management of fine-grained stand detail. Commercial thinning entries would be programmed for stands under 120 years of age, often in conjunction with limited selection harvest in stands over 80 years. Thinnings would usually be designed to assure high levels of volume productivity. Units will retain patches of denser habitat where desired to meet wildlife habitat criteria. Within the tanoak series, underburning or other vegetation management treatments would be required for tanoak control.

Table 1. Northern GFMA Target Stand Species Composition Objectives

Plant Series	Desired species composition (by % conifer basal area)						
	Douglas-fir	Ponderosa Pine	Hemlock	Sugar Pine	Incense Cedar	White Fir	Large Hardwoods
Douglas-fir	60-85	5-20	0	1-2	5-10	2-4	1-5
Hemlock	70-90	0	5-15	1-15	5-15	5-20	1-5
Tanoak	50-80	5-10	0-5	5-20	5-10	1-5	3-6
White fir	10-30	5-20	0-15	1-5	10-30	40-80	0-10

Table 2. Treatment Priority by Ecological Type

Treatment Type	Plant Series			
	Douglas-fir	Hemlock	Tanoak	White Fir
Understory density control	Low	Low	High	Low
Stand density management	High	High	High	High
Density management and group selection	High	High	High	High
Regeneration harvest or overstory removal	Medium	Medium	Medium	Medium
Underburning	Low	Low	High	Low

## Activity Scheduling

Stand treatment priority would result from the watershed analysis process. General priorities for stand treatments are shown in Table 2.

## Insect and Disease Management

Design silvicultural treatments so that within-stand endemic levels do not increase, and where possible, affected trees contribute to the achievement of LUA objectives. Creation of snags over time as a root rot center expands would be an example of using tree disease to meet a structural objective. Any retained mistletoe infected trees should be located in topographic positions that are not conducive to the spread of the disease.

## Forest Condition (Forest Health) Restoration

Priority for restoration treatments will be determined at the stand level and will be based on the stand's ability to meet management objectives in the long-term.

## Connectivity and Diversity Blocks (northern GFMA)

The general prescription would be one of modified even-aged management. For areas where growing

season frosts produce regeneration hazards, pyroclastic soils, and for most areas designed for VRM Class II management, the prescription would be one of shelterwood retention to provide a form of continuous canopy cover. Granitic and schist soils would be managed under structural retention guidelines. Silvicultural practices include the full range of practices consistent with LUA objectives.

## Resource Condition Objectives

- **Connectivity and Diversity:** Manage to provide ecotypic richness and diversity and to provide for habitat connectivity for old growth dependent and associated species within the northern GFMA, maintain a minimum of 25 percent of each block in late-successional condition, in both long- and short-term. Late-successional stands within riparian reserves and other allocations contribute toward this percentage. Minimize fragmentation of interior habitat within block and in adjacent older stands to provide as effective habitat as possible.
- **Commodity Production:** Suitable commercial forestland within blocks would be managed to assure a moderately high level of sustained timber production.

## Stand and Landscape Condition Objectives

- **Target Stand Conditions:** Manage forests of the LUA so that over time landscapes would trend toward a forest composed of stands containing a variety of structures, stands containing trees of varying age and size, and stands with an

assortment of canopy configurations. As stands age, within stand conditions should trend toward those characteristic of older forest types.

- **Seral Composition:** Over time, manage for a minimum of 25 percent late-successional condition in each block.
- **Landscape Composition:** Incorporate connectivity and diversity blocks within landscape planning analysis. Within blocks, manage treatment unit shapes and sizes to mimic natural terrain and stand features. Maintain lowest level of fragmentation and highest level of interior habitat consistent with meeting block management objectives. Retain fine grain patterns within stands.

## Management Direction for Program Implementation

Variation by ecological type: (Same as Northern GFMA) Planning and implementation of specific projects will be based on an understanding of the ecological relationships and limitations of the plant communities proposed for management.

- **Douglas-fir series:** Regeneration patch sizes would vary to maintain pine and other species in the stand. Mistletoe and excessive madrone regeneration will require variation in prescriptions. Retention of canopy cover and careful choice of site preparation technique should be used to maintain deerbrush and grass at levels that do not prevent target stand conditions from being reached. Deerbrush and legumes should be retained in the system.
- **Tanoak series:** Highest district priority for use of prescribed fire. Patch sizes and retention prescriptions should consider the autecology of tanoak and reduce understory tanoak to more natural levels.
- **Hemlock and white fir series:** Management actions will consider requirements of site productivity or enhancement, including use of nitrogen fixing plants.
- **Qualifications of stands for management deferral:** Stands whose current level of large green-trees do not meet retention objectives would not be scheduled for regeneration harvests or overstory removals that removed the large trees. Understory thinning and salvage of volume from these stands following partial or complete stand mortality would be permitted provided structural objectives were met. Manage so that the best ecologically functioning stands would be seldom entered in the short term.
- **Stand structural and species composition:** Same as northern GFMA, except for the retention of 12 to 18 green trees per acre in harvest units.
- **Structural composition:** Maintain site productivity and wildlife habitat values through the retention of structure and the design of practices required to maintain ecosystem processes throughout the management cycle. For modified even-aged systems, retain on the average 12-18 large green trees per acre in harvest units. For shelterwood retention systems, retain 12-25 trees/acre until visual, soil, or frost requirements are met then reduce to 12-18 trees/acre. For structural retention systems, retain 16-25 trees/acre. Large conifers reserved would proportionally represent the total range of tree size classes greater than 20 inches in diameter and would represent all conifer species present. For specific Standards and Guidelines on coarse woody debris, green tree, and snag retention refer to pages C-40 through C-44 of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (sections entitled: "Provide specified amounts of coarse woody debris in matrix management," "Emphasize green-tree and snag retention in matrix management," "Standards and Guideline Specific to Northern Spotted Owl Habitat for Lands Administered by the Bureau of Land Management in Oregon," and "Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats"). In addition, a minimum of two large hardwoods, if present, would be left per acre. Logging safety and potential tree mortality would be considered when determining the distribution of retained trees and snags.
- **Species Composition:** Manage so that tree species trend overtime toward Target Species Composition Objectives (see Table 3). Manage shrubs, forbs, and other vegetation consistent with LUA objectives.

Table 3. Connectivity and Diversity Block Target Stand Species Composition Objectives

Plant Series	Desired Species Composition (by % conifer basal area)						
	Douglas-fir	Ponderosa Pine	Hemlock	Sugar Pine	Incense Cedar	White Fir	Large Hardwoods
Douglas-fir	60-85	5-20	0	1-2	5-10	2-4	1-5
Hemlock	70-90	0	5-15	1-15	5-15	5-20	1-5
Tanoak	50-80	5-10	0-5	5-20	5-10	1-5	3-6
White fir	10-30	5-20	0-15	1-5	10-30	40-80	0-10

## Landscape Design Elements (Same as northern GFMA)

Manage so that continuous forest areas harvested through one or more treatments (i.e., group selections and dense-reserve patches interspersed within a thinning unit) will generally be between 20 and 120 acres in size. Retain dead and green structure within group selections consistent with meeting long term stand composition goals. Situate harvest units to meet general landscape objectives, including minimizing fragmentation and providing general landscape connectivity. Harvest methods could vary within stand to: reflect current within-stand spatial patterns, meet stand objectives, and retain or create patches of reproductive or other habitat for key wildlife species.

## Regeneration Harvests

Regeneration harvests would not be programmed for stands under 150 years of age. Priority for harvest in stands under 150 years of age would be commercial thinning. Blocks would be managed using a 150-year area control rotation.

## Commercial Thinning and Other Density Management (Same as Northern GFMA Except Thinnings Up to 150 Years)

Stand densities would be maintained within desired ranges through a combination of planting density, precommercial thinning, commercial thinning, and management of fine-grained stand detail. Commercial thinning entries would be programmed for stands under 150 years of age often in conjunction with limited selection harvest in stands over 80 years. Thinnings would usually be designed to assure high levels of volume productivity. Units will retain patches of denser habitat where desired to meet wildlife habitat criteria. Within the tanoak series, underburning or other vegetation management treatments would be required for tanoak control.

## Activity Scheduling

Stand treatment priorities for the next decade would be dictated by stand conditions, habitat requirements, and fuel hazard.



## **Insect and Disease Management (Same as Northern GFMA)**

Design silvicultural treatments so that within-stand endemic levels do not increase, and where possible, affected trees contribute to the achievement of LUA objectives. Creation of snags over time as a root rot center expands would be an example of using tree disease to meet a structural objective. Any retained mistletoe infected trees should be located in topographic positions that are not conducive to the spread of the disease.

## **Southern General Forest Management Area (SGFMA)**

The general prescription would involve management within strategies that are designed to mimic natural ecological processes and meet species diversity, structural diversity, and landscape diversity objectives. In most cases, the general prescription would be one of structural retention. Modified even-aged and shelterwood retention systems would be utilized dependant upon factors such as site quality, presence of disease, and visuals. Silvicultural practices include the full range of practices consistent with LUA objectives.

## **Resource Condition Objectives**

- **Commodity production:** Suitable commercial forestland would be managed to assure a moderately high level of sustained timber productivity.
- **Forest condition (Forest Health):** Achievement of management objectives, including sustainability of both commodity production and wildlife habitat, requires that management emphasis be placed on treatments and harvests that restore stand condition and ecosystem productivity. Management actions include density management and understory reduction operations that reduce competition, increased use of understory

prescribed fire, and fertilization. Removal of biomass from the understories of stands in the pine series to restore stand health, reduce overstory mortality, and restore habitat productivity may be a below cost operation on many sites.

- **Habitat retention, restoration, and production:** Manage for minimal loss (including loss from wildfire) and long-term recovery of intact forest habitat over 150 years of age and toward an increase in the amount of spotted owl reproductive habitat. Manage fifth field watersheds so that a minimum of 15 percent of the federal forestland is in late successional condition. Selection of stands for management will involve consideration of the desired blend of seral stages and stand densities. Manage landscape planning blocks to maintain desired levels and distribution of early seral vegetation. Manage to retain a minimum of 40 percent canopy cover at the stand level in most regeneration harvest units, except for units of the pine series or where stand condition or site characteristics require lower levels.

## **Stand and Landscape Condition Objectives**

**Target Stand Conditions:** Manage forests of the LUA so that over time landscapes would trend toward a forest composed of stands containing a variety of structures, stands containing trees of varying age and size, and stands with an assortment of canopy configurations. As stands age, within stand conditions should trend toward those characteristic of older forest types. Manage to provide for general connectivity. Consistent with operational and logging practicality, retain fine-grained patterns.

**Seral Composition:** Over time, manage for a balance of seral stages consistent with LUA objectives.

**Landscape Composition:** Manage toward a mix of stand conditions and seral patterns with consideration to three levels of scale: physiographic province (river basin / mountain range), landscape block (watershed), and within stand detail. Manage treatment unit shapes and sizes to mimic natural terrain and stand features. Minimize fragmentation and maintain the highest level of interior habitat consistent with meeting overall resource objectives, except for pine series forest types where a mix of various sized seral patches may be desired.

# Management Direction for Program Implementation

Variation by ecological type: Planning and implementation of specific projects will be strongly based on an understanding of the ecological relationships and limitations of the plant communities proposed for management.

- **Pine series:** Prescriptions would discriminate in favor of a higher proportion of ponderosa pine in the stand than current proportion and would target reduction in understory densities. Stand densities would normally be reduced to less than 160 square feet of basal area.
- **Douglas-fir series:** Regeneration patch sizes would vary to maintain pine and other species in the stand. Mistletoe and excessive madrone regeneration will require variation in prescriptions. Retention of canopy cover and careful choice of site preparation technique should be used to maintain deerbrush and grass at levels that do not prevent target stand conditions from being reached. Deerbrush and legumes should be retained in the system.
- **Tanoak series:** Highest district priority for use of prescribed fire. Patch sizes and retention prescriptions should consider the autecology of tanoak and reduce understory tanoak to more natural levels.
- **White fir series:** Management actions would consider limitations imposed by growing season frosts and will be designed to restore a higher proportion of pine and Douglas-fir in stands from which those components had been lost.
- **Qualification of stands for management deferral:** Harvest entries would usually not be planned for the next decade for stands with less than 40 percent live canopy cover, except for stands of the pine series. Salvage of volume from these stands following partial or complete stand mortality would be permitted provided residual structural objectives were met.

# Stand Structural and Species Composition

**Structural Composition:** Maintain site productivity and wildlife habitat values through the retention of structure and the design of practices required to maintain ecosystem processes throughout the management cycle. For structural retention systems, retain on the average 16-25 larger green trees per acre in harvest units. For specific Standards and Guidelines on coarse woody debris, green tree, and snag retention refer to pages C-40 through C-44 of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (sections entitled: "Provide specified amounts of coarse woody debris in matrix management," "Emphasize green-tree and snag retention in matrix management," "Standards and Guideline Specific to Northern Spotted Owl Habitat for Lands Administered by the Bureau of Land Management in Oregon," and "Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats"). In addition, a minimum of two large hardwoods, if present, would be left per acre. Logging safety and potential tree mortality would be considered when determining the distribution of retained trees and snags.

**Species Composition:** Manage so that tree species trend over time toward Target Species Composition Objectives (see Table 4). Manage shrubs, forbs, and other vegetation consistent with LUA objectives.

# Landscape Design Elements

Manage so that continuous forest areas harvested through one or more treatments (i.e., group selections and dense-reserve patches interspersed within a thinning unit) will generally be between 20 and 120 acres in size. Retain dead and green structure within group selections consistent with meeting long term stand composition goals. Situate harvest units to meet general landscape objectives, including minimizing fragmentation and providing general landscape connectivity. Harvest methods could vary within stand to: reflect current within-stand spatial patterns, meet stand objectives, and retain or create patches of reproductive or other habitat for key wildlife species.

Table 4. Southern GFMA Target Stand Species Composition Objectives

Plant Series	Desired species composition (by % conifer basal area)						
	Douglas-fir	Ponderosa Pine	Hemlock	Sugar Pine	Incense Cedar	White Fir	Large Hardwoods
Douglas-fir	60-85	5-20	0	1-2	5-10	2-4	1-5
Ponderosa pine	10-40	30-70	0	0-2	10-30	0	1-5
Tanoak	50-80	5-10	0-5	5-20	5-10	1-5	3-6
White fir	10-30	5-20	0-15	1-5	10-30	40-80	0-10

## Regeneration Harvests

Regeneration harvests would not be programmed for stands under 120 years of age and generally would not be programmed for stands under 150 years of age within the next decade unless required by deteriorating stand condition, disease, or other factors that threaten the integrity of the stand. Priority for harvest in stands under 150 years of age would be commercial thinning.

Regeneration strategies would be planned to produce the highest probability of success at the lowest practical cost and will include provisions for species diversity and long-term site productivity within the design. Practices will be strongly influenced by consideration of ecological site potential, by the need to retain sufficient canopy to assure control of competing vegetation, by the requirements of owl habitat connectivity at the stand level, and by factors including growing season frost potential.

## Commercial Thinning

Stand densities would be maintained within desired ranges through a combination of planting density, precommercial thinning, commercial thinning, and management of fine-grained stand detail. Commercial thinning entries would be programmed for stands under 150 years of age, often in conjunction with limited selection harvest in stands over 80 years. Thinning in older stands will often result in understory regeneration and the development of multiple-canopied stands. Units will retain patches of denser habitat where desired to meet wildlife habitat criteria. Within the tanoak series, underburning or other vegetation management treatments would be required for tanoak control.

## Activity Scheduling

Stand treatment priority would result from the watershed analysis process. General priorities for stand treatments are shown in Table 5.

Table 5. Treatment Priority by Ecological Type

Treatment Type	Douglas-fir	Plant Series		White Fir
		Pine	Tanoak	
Understory density control	Low	High	High	Medium
Stand density management	High	High	Medium	Medium
Density management and group selection	Medium	Medium	High	Medium
Regeneration harvest or overstory removal	Low	Low	Low	Low
Underburning	Low	Medium	High	Low

## Insect and Disease Management

Design silvicultural treatments so that within-stand endemic levels do not increase, and where possible, affected trees contribute to the achievement of LUA objectives. Creation of snags over time as a root rot center expands would be an example of using tree disease to meet a structural objective. Any retained mistletoe infected trees should be located in topographic positions that are not conducive to the spread of the disease and which are favorable for the production of nest groves.

## Forest Condition (Forest Health) Restoration

Priority for restoration treatments will be determined at the stand level and will be based on the stand's ability to meet management objectives in the long-term.

## Late-Successional Reserves

Late-successional reserves would be managed to protect and enhance conditions of late-successional and old growth forest ecosystems, which serve as habitat for the northern spotted owl and other late-successional and old growth related species. Silvicultural practices and salvage should therefore be guided by the objective of maintaining adequate amounts of suitable habitat.

Silvicultural practices within reserves would be limited to those practices beneficial to the creation of late-successional forest conditions and would include reforestation, maintenance and protection of existing young stands, density management, and fertilization. Thinning (precommercial and commercial) may occur in stands up to 80 years old regardless of the origin of the stand. In addition to practices that placed or maintain stands on desired developmental pathways, practices designed to restore forest condition (forest health), and other practices designed to reduce the risks of stand loss would be done to maintain long-term habitat viability.

"While risk-reduction efforts should generally be focused on young stands, activities in older stands may be appropriate if: (1) the proposed management

activities will clearly result in greater assurance of long-term maintenance of habitat, (2) the activities are clearly needed to reduce risks, and (3) the activities will not prevent the Late-Successional Reserves from playing an effective role in the objectives for which they were established." ("Guidelines to Reduce Risks of Large-Scale Disturbance," page C-13, Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl).

Salvage of mortality volume is limited to stand-replacing disturbance events exceeding 10 acres under standards outlined under "Guidelines for Salvage," page C-13, Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl.

## Riparian Reserves

Silvicultural activities within Riparian Reserves will be designed to meet the objectives of the Aquatic Conservation Strategy. Generally, standards and guidelines prohibit or regulate activities in the reserves that retard or prevent attainment of Strategy objectives. Silvicultural practices would be applied within the reserves to control stocking, to reestablish and manage stands, to establish and manage desired nonconifer vegetation, and to acquire desired vegetation characteristics needed to attain objectives of the Aquatic Conservation Strategy. Forest condition (forest health) restoration would be done where required to attain objectives of the Aquatic Conservation Strategy.

Salvage operations would be done only when watershed analysis determines that present and future coarse woody debris needs are met and other Aquatic Conservation Strategy objectives are not adversely effected. Conduct salvage and fuelwood cutting if required to attain Aquatic Conservation Strategy objectives where catastrophic events such as fire, flooding, volcanic, wind, or insect damage have resulted in degraded riparian conditions.

## Adaptive Management Areas (AMAs)

Standards and guidelines are to be developed to meet the objectives of the AMA and the overall strategy. Silvicultural activities within the Applegate

Adaptive Management Area would emphasize the development and testing of forest management practices, including partial cutting, prescribed burning, and low impact approaches to harvest (e.g., aerial systems) that provide for a broad range of forest values, including late-successional forest and high quality riparian habitat. Activities designed to improve or maintain forest condition (health) are expected to be prevalent.

The intent of the standards and guidelines for matrix management (there is no matrix in AMAs) regarding specific measures for coarse woody debris and for green-tree and snag retention must be met in Adaptive Management Areas. Specific standards and guidelines are not prescribed for these areas.

## **Late-Successional Reserves Within AMAs**

Silvicultural practices will be managed according to the standards and guidelines for such reserves. Management will be designed to reduce risk of loss to natural disturbance.

## **Riparian Reserves Within AMAs**

Riparian protection in Adaptive Management Areas should be comparable to that prescribed for other federal land areas.

## **Other Allocations**

Silvicultural practices where appropriate would be designed to be consistent with the objectives of the allocation.

## **Hardwoods**

Manage hardwood stands for production of commodities as markets develop. Regenerate

harvested stands with the same hardwood species mix. Harvest up to 1/200 of the hardwood allocation per year.

Suitable commercial forestland allocated to timber production, but dominated by grass, shrubs, and hardwoods that resulted from human activity would be restored to conifer production. Hardwood species would be retained to maintain species richness. Natural hardwood and shrub communities on suitable commercial forestland would not be converted to conifer production.

Stands on commercial forestland that are dominated by commercial conifers, which also contain a high percentage of hardwoods as a successional stage, would be managed for timber production.

Manage white oak woodlands to meet wildlife, range, and biological diversity objectives.

## **Port-Orford Cedar**

Silvicultural activities in areas containing Port-Orford cedar would be consistent with the Port-Orford Cedar Management Plan.

## **Research**

A variety of wildlife and other research activities may be ongoing, currently proposed, or proposed in the future in all land allocations. Provided certain requirements are satisfied, ongoing research would continue and new research would begin. For a discussion of research requirements see, "Research" page C-4, under "Standards and Guidelines Common to all Land Allocations" in Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl. Research discussions can also be found under some of the individual allocations.





# Appendix L

## Medford District Forest Genetics Program

This appendix describes the objectives of the forest genetics program, the present status, and proposed direction. Readers who are interested in technical details of the tree improvement program are referred to the BLM Western Oregon Tree Improvement Plan (1987), and the Northwest Tree Improvement Cooperative Handbook (1988). Additional information on genetic resource issues can be found in "The Value of Genetic Resources" (Oldfield 1984), and "Genetics and Conservation of Rare Plants" (Falk 1991).

### Introduction

For thousands of years humans have selected and used the genetic variation that is naturally present in plants and animals. Genetic diversity is the foundation for plant and animal improvement programs. Modern crop and livestock improvement programs have substantially increased yields and productivity with selection and breeding. The need for food production and natural resources is increasing as the human population increases. Genetic improvement programs have and will continue to help meet these demands.

Genes within living cells of all species carry variation, or diversity, to future generations of each species. Genetic diversity is a key component of an ecosystem. Broad genetic diversity is considered to be an asset because variability is a buffer against change. Problems can occur when genetic diversity is too narrow. Genetic uniformity decreases resilience to change and increases the potential for problems due to pests and diseases. Environmental conditions influence the expression of the genetic code. The physical characteristics of an organism is dependent on the interaction of its genes with the environment. Ecosystems are dynamic communities that change over time and plants and animals are impacted by the changes. Species with wide tolerances can adapt to changes, while those with narrow tolerances can be heavily impacted.

The amount and pattern of genetic diversity in a species develops in part as an organism responds to the environment. This adaptation occurs over a long period of time as the environmental conditions select for or against specific genetic traits. Each species has a unique genetic structure. Genetic studies are conducted to describe and quantify the amount of genetic variation within a species. This information is necessary to direct management and to help guide operational projects.

Genetic diversity can be described as a natural resource. Management and conservation of genetic resources is vital for many reasons. Genetic improvement programs are a great benefit to society and materials produce by them have a large economic value. Genetic material from wild stock is an important source of variability that can be infused into existing improved varieties. Many medicinal compounds are derived from plants and there is the potential for more undiscovered uses. Conserving genetic diversity for all species allows evolutionary processes to continue within the conditions of the natural environment.

Tree improvement is the application of genetic principles and methods to select and enhance desirable traits in forest trees. The Bureau of Land Management has participated in cooperative tree improvement programs for forest trees in the Pacific Northwest since the late 1950s. The emphasis to date has been to increase growth rate and disease resistance. Ecosystem management principles are changing the focus of the tree improvement program. The existing tree improvement and seed orchard programs will be integrated into a broader based forest genetics program. Genetic diversity issues for many organisms will likely become more important in the future. A forest genetics program is consistent with ecosystem management principles and can be expanded to cover the genetics of other plants and animals.

## Program Objectives

The objectives of the forest genetics program underlay a broad spectrum of land management activities. The biological foundation of ecosystem management rests upon a clear understanding of the genetic diversity present within the system. The following objectives are broadly defined and include tree improvement, gene management, and gene conservation activities.

- Provide for seed production as needed for planting species on BLM lands. Develop seed collection and seed deployment guidelines as needed.
- Develop genetically improved materials as needed to meet BLM's resource management objectives.
- Maintain and restore the genetic diversity within managed forest stands.
- Analyze needs and implement gene conservation strategies as appropriate.
- Collect information on genetic variation from important species.
- Contribute to the development of genetic information needed for landscape analysis, ecological assessments, research studies, and ecosystem management projects.
- Maintain flexibility within the program so that information fulfills the current needs and anticipates future needs.

## Status of the Existing Program

The BLM tree improvement program has generated a substantial and important genetic information base for several conifer species. The data is significant to ecosystem management because it describes the nature and extent of genetic variation present for certain traits of the species.

Tree improvement programs function at a landscape level. Genetic diversity is continuous across the landscape and tree improvement programs are implemented at this level. Each program is carried out within a small ecologically similar area called a breeding unit. Most tree improvement programs are cooperatives with BLM and adjacent land owners. A cooperative structure is beneficial because it greatly increases the number of trees in the genetic base and the trees are located across a broader geographic area. Program costs are efficiently shared among cooperators. BLM is cooperating in more than 50 breeding units, which include several million acres of forest land in western Oregon.

The following accomplishments summarize the status of the program.

- Several conifer species (Douglas-fir, western white pine, sugar pine) have been selected for genetically controlled characteristics such as growth rate, tree form, and resistance to disease.
- Field tests have been established using progeny of the selected trees. These progeny test sites have been measured at regular intervals.
- Seed orchards have been established using parent trees. The orchards are producing locally adapted seed for several major species (Douglas-fir, western hemlock, western red cedar, ponderosa pine, grand fir, incense cedar).
- Each year improved seed is sown for replanting a portion of the harvested forest acres.
- The seed orchards are managed for seed production. Stimulation techniques are part of the management to encourage cone production. Trees that have slow growth in field tests or show undesirable characteristics are removed from the orchard. This practice is known as "rogueing".
- Second generation programs have been initiated in some breeding units. Selection and breeding work is underway.
- Facilities for cone and seed processing and greenhouses for growing custom tailored lots of many species are located at the seed orchards.



## Proposed Program Direction

The future forest genetics program will be more complex under ecosystem management than under the previous management plans. Improvement of growth and disease resistance will continue as an important component of the forest genetics program. Gene conservation and gene resources management issues will be emphasized to a greater degree. Gene conservation is accomplished by specific actions taken to conserve the genetic variation of a species. The purpose is to maintain the range of natural diversity within the species. Gene management is the integration of genetic principles into resource management actions. Ecosystems are complex and genetic diversity is important for all organisms. Genetic principles must be considered when planning and implementing resource management projects so that genetic diversity is maintained.

The following is a summary of the direction for the forest genetics program.

- Progeny test sites will be maintained and measurements of growth and other characteristics will continue. Long-term management plans for the sites will be developed.
- Seed orchards will be maintained and managed to produce seed as needed for ecosystem management projects.
- Improved tree seedling stock will be planted on a portion of the harvested acres.

- Tree improvement programs have emphasized cooperative efforts for operational programs and research studies with state, private, and other government agencies. These partnerships will continue.
- Genetic expertise and genetically appropriate guidelines will be provided for ecosystem management implementation.
- A forest genetic plan will be prepared. It will include a strategy for gene conservation, maintenance of genetic diversity, and definition of a monitoring baseline to quantify genetic variation.

Ecosystem management concepts have challenged the forest genetics program with more issues than was done by the previous forest management plans. The former program must be meshed with the additional needs defined by ecosystem management so previous gains are maintained and future needs are addressed. Policy and land use allocations will likely change over time. A flexible broad based forest genetics program is the best option to accommodate changing conditions. Tree improvement, gene management, and gene conservation objectives share a common genetic basis. Each aspect of the program can compliment the others. All aspects should include provisions for maintaining and enhancing genetic diversity. Tree improvement programs are intensive management practices that can achieve higher productivity and help meet the demand for wood products. Genetic information is needed to support and guide ecosystem management projects. Conservation of genetic diversity is vital to ecosystem health and stability.



# Appendix M

## Proposed Restrictions on Mineral and Energy Exploration and Development Activity

This appendix discusses the leasing stipulations as they would be applied to BLM-administered lands in the planning area under each alternative. Operating standards pertinent to the locatable and saleable minerals program are also described. Mineral exploration and development on federal lands must also comply with laws and regulations administered by several agencies of the State of Oregon, however, these requirements are not discussed in this document.

### Leasable Mineral Resources

#### Oil and Gas Leasing

The Mineral Leasing Act of 1920 (as amended) provides all publicly-owned oil and gas resources be open to leasing unless a specific land order has been issued to close the area. Through the land use planning process, the availability of these resources for leasing is analyzed taking into consideration development potential and surface resources. Constraints on oil and gas operations are identified and placed in the leases as notices and stipulations. Oil and gas leases are then issued from the BLM Oregon State Office in Portland. Specific proposed notices and stipulations are listed by alternative in this appendix.

The issuance of a lease conveys to the lessee an authorization to actively explore and/or develop the lease in accordance with the attached stipulations and the standard terms outlined in the Federal Onshore Oil and Gas Leasing Reform Act (FOOGLRA). Restrictions on oil and gas activities in the planning area will take the form of timing limitations, controlled surface use (CSU), or no surface occupancy (NSO) stipulations used at the discretion of the Authorized Officer to protect identified surface resources of special concern.

Stipulations would be attached to each lease before it is offered for sale by the field office, which reviews the lease tract. The review would be conducted by

consulting the direction given in this resource management plan. In addition, all BLM-administered land within the planning area will be subject to the lease notices as shown on the following pages. All federal lessees or operators are required to follow procedures set forth by: Onshore Oil and Gas Orders, Notice to Lessee, the Federal Oil and Gas Royalty Management Act (as amended), the Federal Onshore Oil and Gas Leasing Reform Act, and Title 43 Code of Federal Regulations, Part 3100.

### Oil and Gas Operations

#### Geophysical Explorations

Geophysical operations may be conducted regardless of whether the land is leased or not. Notices to conduct geophysical operations on BLM-surface are received by the resource area. Administration and surface protection are accomplished through close cooperation of the operator and BLM. Seasonal restrictions may be imposed to reduce fire hazards, conflicts with wildlife, and watershed damage, etc. An operator is required to file a "Notice of Intent to Conduct Oil and Gas Exploration Operations" for all geophysical activities on BLM-administered land. The notice should adequately show the location and access routes, anticipated surface damages, and time frames. The operator is required to comply with written instructions and orders given by the Authorized Officer and must be bonded. Signing of the "Notice of Intent" by the operator signifies agreement to comply with the terms and conditions of the notice, regulations, and other requirements prescribed by the Authorized Officer. A prework conference and/or site inspection may be required. Periodic checks during and upon completion of the operations will be conducted to ensure compliance with the terms of the "Notice of Intent", including reclamation.

#### Drilling Permit Process

The federal lessee or operating company selects a drill site based on spacing requirements, subsurface

and surface geology, geophysics, topography, and economic considerations. Well spacing is determined by the Authorized Officer after considering topography, reservoir characteristics, protection of correlative rights, potential for well interference, interference with multiple use of lands, and protection of the surface and subsurface environments. Close coordination with the state would take place. Written field spacing orders are issued for each field. Exceptions to spacing requirements involving federal lands may be granted after joint State and BLM review.

## Notice of Staking

Once the company makes the decision to drill, they must decide whether to submit a "Notice of Staking" (NOS) or apply directly for a permit to drill. The NOS is an outline of what the company intends to do, including a location map and sketched site plan. The NOS is used to review any conflicts with known critical resource values and to identify the need for associated rights-of-way and special use permits. BLM utilizes information contained in the NOS and obtained from the on-site inspection to develop stipulations to be incorporated into the application for permit to drill. Upon receipt of the NOS, pertinent information about the proposed well is posted in the district office for a minimum 30-day public comment period.

## Application for Permit to Drill

The operator may or may not choose to submit a NOS; in either case, an Application for Permit to Drill (APD) must be submitted prior to drilling. An APD consists of a 12-point surface plan, which describes any surface disturbances, and is reviewed by resource specialists for adequacy with regard to lease stipulations designed to mitigate impacts to identified resource conflicts with the specific proposal and an 8-point subsurface plan, which details the drilling program and is reviewed by the staff petroleum engineer and geologist. This plan includes provisions for casing, cementing, well control, and other safety requirements.

For the APD option, the on-site inspection is used to assess possible impacts, and develop stipulations to minimize these impacts. If the NOS option is not utilized, the 30-day posting period begins with the filing of the APD. Private surface owner input is actively solicited during the APD stage.

## Geothermal Leasing

The Geothermal Steam Act of 1970 (as amended) provides for the issuance of leases for the development and utilization of geothermal steam and associated geothermal resources. Geothermal leasing and operational regulations are contained in Title 43 Code of Federal Regulations, Part 3200. Through the land use planning process, the availability of the geothermal resources for leasing is analyzed, taking into consideration development potential and surface and subsurface resources. Constraints on geothermal operations are identified and placed in the leases as stipulations. Geothermal leases are then issued by the BLM Oregon State Office.

Geothermal resource within a known geothermal resource area (KGRA) are offered by competitive sale. Outside of KGRAs, leases can be issued noncompetitively (over-the-counter). Prior to a competitive lease sale or the issuance of a noncompetitive lease, each tract would be reviewed and appropriate lease stipulations would be included. The review would be conducted by consulting the direction given in this resource management plan.

The issuance of a lease conveys to the lessee authorization to actively explore and/or develop the lease in accordance with regulations and lease terms and attached stipulations. Subsequent lease operations must be conducted in accordance with regulations, Geothermal Resources Operational Orders, and any Conditions of Approval developed as a result of site-specific NEPA analysis. In the planning area, restrictions in some areas would include timing limitations, controlled surface use, or NSO stipulations used at the discretion of the Authorized Officer to protect identified surface resources of special concern.

In addition to restrictions related to the protection of surface resources, the various stipulations and conditions could contain requirements related to protection of subsurface resources. These may involve drainage protection of geothermal zones, protection of aquifers from contamination, or assumption of responsibility for any unplugged wells on the lease.

Development of geothermal resources can be done only on approved leases. Orderly development of a geothermal resource from exploration to production involves several major phases that must be approved separately. Each phase must undergo the appropriate level of National Environmental Policy Act

(NEPA) compliance before approved and authorization issued.

## Leasing Stipulation Summary

On the following pages, the mineral leasing notices and stipulations are listed, which would be attached to any lease having special resource values. The tracts of land these apply to will in many cases differ by alternative (see Table 2-EM-1a). Those notices and stipulations shown as common for all alternatives are considered to be the minimum necessary in order to issue leases in the operating area. Under all alternatives, the standard leasing stipulations (Form 3100-11) alone would be utilized on most lands. The powersite stipulation (Form 3730-1) would be used on all lands included within powersite withdrawals, and the stipulation found on Form 3109-2 would be utilized for all lands under the jurisdiction of the Department of the Army Corps of Engineers.

Lease notices to protect threatened and endangered plant and animal species and cultural resources would apply to all BLM-administered land in the planning area. A controlled surface use special stipulation would be utilized to protect fragile granitic, schist, pyroclastic soils and control visual impacts on VRM Class II areas. NSO special stipulations would be utilized on the following areas:

- lands included within R&PP and FLPMA leases;
- developed recreation sites;
- special areas (ACECs and EEAs);
- progeny plantation sites;
- the Provolt Seed Orchard;
- lands classified as VRM Class I;
- bald eagle nest sites and nesting habitat; and
- northern spotted owl nest sites.

Each stipulation also include waivers, exceptions, and modifications defined as follows:

**Waiver.** The lifting of a stipulation from a lease which constitutes a permanent revocation of the stipulation from that time forward. This is usually a substantial change and requires a 30-day posting of the action for public involvement before the permitting activity associated with the process can be approved.

**Exception.** This is a one-time lifting of the stipulation to allow a permitting activity for a specific proposal. It has no permanent effect on the lease stipulation and

would not constitute a substantial change to the stipulation and requires no posting.

**Modification.** This is a change to a stipulation which either temporarily suspends the stipulation requirement or permanently lifts the application of the stipulation on a given portion of the lease. It may or may not require posting based on whether or not the change is determined to be substantial by the Authorized Officer.

## Leasing Notices & Stipulations Common Under All Alternatives

### Standard Leasing Stipulations.

- a) Standard stipulations for oil and gas are listed in Section 6 of "Offer to Lease and Lease for Oil and Gas" Form 3100-11. They are:
- Lessee shall conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights grants, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands including the approval of easement or rights-of-way. Such uses shall be conditioned to prevent unnecessary or unreasonable interference with rights to lessee.
  - Prior to disturbing the surface of leased lands, lessee shall contact BLM to be apprised of procedures to be followed and modifications or reclamation measure that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short-term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction



of such species or objects until appropriate steps have been taken to protect the site or recover the resources as determined by BLM in consultation with other appropriate agencies.

b) Standard stipulations for geothermal leasing can be found on Offer to Lease and Lease for Geothermal Resources (Form 3200-24), Section 6, and are very similar to those described above for oil and gas leasing.

## Powersite stipulation

Form No. 3730-1 is to be utilized on all lands within powersite reservations.

Stipulation for lands under jurisdiction of Department of the Army Corps of Engineers (Form No. 3109-2).

- All areas within 2,000 feet of any major structure including, but not limited to, dams, spillways, or embankments are restricted areas. The lessee, his operators, agents, or employees should not disturb the surface or subsurface estates of the restricted area. If the commander or the authorized representative discovers an imminent danger to safety or security which would allow no time to consult BLM, that person may order such activities stopped immediately. The Authorized Officer of BLM should review the order and determine the need for further remedial action. Platform drilling over water areas (flood pool/drawdown zone) is prohibited. The method of drilling should be directional from an off-site base. This restriction is required because occupancy would negatively affect or interfere with authorized project purposes and/or operational needs as listed:

Fish and Wildlife Habitat - Power Production  
Flood Control - Recreation  
Irrigation - Water Quality  
Navigation - Water Supply  
Other Legislative Authorities

- Land surface occupancy may be permitted within the lease area; however, directional drilling from an off-site base may be required. The Secretary of the Army or designee reserves the right to require cessation of operations if a national emergency arises. Upon request of approval from higher authority, the Commander will give the lessee written notice, or if time permits, request BLM to give notice of the required cessation.

## Lease Notices

The following Notices are to be issued with each lease for all BLM-administered land within the planning area. Lease notices are attached to leases in the same manner as stipulations; however, there is an important distinction between lease notices and stipulations. Lease notices do not involve new restrictions or requirements. Any requirements contained in a lease notice must be fully supported in either laws, regulations, policy, or onshore oil and gas orders.

## NOTICE-Wildlife

### Northern spotted Owl Nest Sites and Nesting Habitat

- The lease lands are in an area suitable for the habitat of the northern spotted owl (*Strix occidentalis caurina*), an animal species officially listed as a threatened species.
- All viable habitat will be identified for the lessee/operator by the Authorized officer of BLM during the preliminary environmental review of the proposed surface use plan. If the field examination indicates that the proposed activity may effect these species, then consultation will be conducted with the U.S. Fish & Wildlife Service pursuant to Sec. 7 of the Endangered Species Act of 1973, as amended. The consultation will determine whether or not the proposed activity would jeopardize the continued existence of the species, and if so, the extent if any, the proposed activity will be allowed.

Authority: The Endangered Species Act of 1973.

### American Peregrine Falcon and Nesting Habitat

- The lease lands are in an area suitable for the habitat of the American Peregrine Falcon (*Falco peregrinus anatum*), an animal species officially listed as a threatened species.
- All viable habitat will be identified for the lessee/operator by the Authorized officer of BLM during the preliminary environmental review of the proposed surface use plan. If the field examination indicates that the proposed activity may effect these species, then consultation will be conducted with the U.S. Fish & Wildlife Service pursuant to Sec. 7 of the Endangered Species Act of 1973, as amended. The consultation will determine whether or not the proposed activity would jeopardize the

continued existence of the species, and if so, the extent if any, the proposed activity will be allowed.

**Authority:** The Endangered Species Act of 1973.

#### Threatened and Endangered Animal Species

- The lease lands are in an area suitable for the habitat of the \_\_\_\_\_, an animal species (officially listed/proposed for listing) as a (threatened/endangered) species.
- All viable habitat will be identified for the lessee/operator by the Authorized officer of BLM during the preliminary environmental review of the proposed surface use plan. If the field examination indicates that the proposed activity may affect these species, then consultation will be conducted with the U.S. Fish & Wildlife Service pursuant to Sec. 7 of the Endangered Species Act of 1973, as amended. The consultation will determine whether or not the proposed activity would jeopardize the continued existence of the species, and if so, the extent if any, the proposed activity will be allowed.

**Authority:** The Endangered Species Act of 1973.

#### Threatened and Endangered Plant Species

- The lease lands are in an area suitable for the habitat of the \_\_\_\_\_ (Common Name (scientific Name)), a plant species (officially listed/proposed for listing) as a(n) (threatened/endangered) species.
- All viable habitat will be identified for the lessee/operator by the Authorized officer of BLM during the preliminary environmental review of the proposed surface use plan. If the field examination indicates that the proposed activity may effect these species, then consultation will be conducted with the U.S. Fish & Wildlife Service pursuant to Sec. 7 of the Endangered Species Act of 1973, as amended. The consultation will determine whether or not the proposed activity would jeopardize the continued existence of the species, and if so, the extent if any, the proposed activity will be allowed.

**Authority:** The Endangered Species Act of 1973.

## NOTICE-Cultural Resources

An inventory of the leased lands may be required prior to surface disturbance to determine if cultural resources are present and to identify needed mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by

this lease, the lessee or operator should contact the Surface Management Agency (SMA) to determine if a cultural resource inventory is required. If an inventory is required:

- The SMA will complete the required inventory, or the lessee or operator at their option may engage the services of a cultural consultant acceptable to the SMA to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the standard 10-acre minimum to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the SMA for review and approval no later than that time when an otherwise complete application for approval of drilling or subsequent surface-disturbing operation is submitted.
- Important mitigation measures required by the SMA. Mitigation may include the relocation of proposed lease-related activities or other protective measures such as data recovery and extensive recordation. Where effects to cultural resources cannot be mitigated to the satisfaction of the SMA, surface occupancy on that area must be prohibited. The lessee or operator shall immediately bring to the attention of the SMA any cultural resources discovered as a result of approved operations under this lease and shall not disturb such discoveries until directed to proceed by the SMA.

**Authorities:** Compliance with Section 106 of the National Historic Preservation Act is required for all actions which may affect cultural properties eligible to the National Register of Historic Places. Section 6 of the Oil and Gas Lease Terms (Form 3100-11) requires that operations be conducted in a manner that minimizes adverse effects to cultural and other resources.

## Leasing Stipulations

The following special stipulations are to be utilized on specifically designated tracts of land as described under the various alternatives. The site-specific lands would change by alternative, but the stipulation will be the same (see Appendix 2-EM-1a for application of leasable mineral stipulations by alternative). These special stipulations would be applied to the appropriate alternatives.



## NSO-Land Use Authorizations

**Stipulation:** Surface occupancy and use is prohibited on Recreation and Public Purposes (R&PP) and Federal Land Policy and Management Act (FLPMA) leases.

**Objective:** To protect uses on existing R&PP and FLPMA leases.

**Exception:** An exception to this stipulation may be modified by the Authorized Officer if the land use authorization boundaries are modified.

**Waiver:** This stipulation may be waived by the Authorized Officer if all land use authorizations within the leasehold have been terminated, canceled, or relinquished.

## NSO-Recreation

**Stipulation:** Surface occupancy and use is prohibited within developed recreation areas.

**Objective:** To protect developed recreation areas.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan demonstrating effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The boundaries of the stipulated area may be modified by the Authorized Officer if the recreation area boundaries are changed.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that the entire leasehold no longer contains developed recreation areas.

## NSO-Special Areas

**Stipulation:** Surface occupancy and use is prohibited within areas of critical environmental concern (ACECs), research natural areas (RNAs), and environmental education areas (EEAs).

**Objective:** To protect important historic, cultural, scenic values, natural resources, natural systems or processes, threatened and endangered plant species, and/or natural hazard areas.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan demonstrating that effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The boundaries of the stipulated area may be modified by the Authorized Officer if the ACEC or EEA boundaries are changed.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that the entire leasehold no longer contains designated ACECs or EEAs.

## NSO-Progeny plantation sites.

**Stipulation:** Surface occupancy and use is prohibited within progeny plantation sites.

**Objective:** To protect progeny plantation sites.

**Exception:** None.

**Modification:** The boundaries of the stipulated areas may be modified by the Authorized Officer if the progeny plantation site boundaries are changed.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that the entire leasehold no longer contains progeny plantation sites.

## NSO-Provolt and CASSO Seed Orchards.

**Stipulation:** Surface occupancy and use is prohibited within the Provolt and CASSO seed orchards.

**Objective:** To protect the Provolt and CASSO seed orchards.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan demonstrating that effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The boundaries of the stipulated area may be modified by the Authorized Officer if the seed orchard site boundaries are changed.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that the entire leasehold no longer contains a developed seed orchard.

## **NSO-Visual Resource Management Class I**

**Stipulation:** Surface occupancy and use is prohibited in VRM Class I areas.

**Objective:** To preserve the existing character of the landscape.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan demonstrating effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The boundaries of the stipulated area may be modified by the Authorized Officer if the boundaries of the VRM Class I area are changed.

**Waiver:** This stipulation may be waived by the Authorized Officer if all VRM Class I areas within the leasehold are reduced to a lower VRM Class. Areas reduced to a lower VRM Class will be subject to the Controlled Surface Use stipulation for visual resources.

## **NSO-Wildlife**

### **Bald Eagle Nest Sites and Nesting Habitat**

**Stipulation:** Surface occupancy and use is prohibited within 1/2-mile of known bald eagle nest sites which have been active within the past seven years and within bald eagle nesting habitat in riparian areas.

**Objective:** To protect bald eagle nesting sites and/or nesting habitat in accordance with the Endangered Species Act (ESA).

**Exception:** An exception may be granted by the Authorized Officer if the operator submits a plan which demonstrates that the proposed action will not affect the bald eagle or its habitat. If the Authorized Officer determines that the action may or will have an adverse effect on the species, the operator may submit a plan demonstrating that the effects can be adequately mitigated. This plan must be approved by BLM in consultation with the U.S. Fish and Wildlife Service (USF&WS).

**Modification:** The boundaries of the stipulated area may be modified if the Authorized Officer, in consultation with USF&WS, determines that portion of the area can be occupied without adversely affecting bald eagle nest sites or nesting habitat.

**Waiver:** This stipulation may be waived if the Authorized Officer, in consultation with USF&WS, determines that the entire leasehold can be occupied without adversely affecting bald eagle nest site or nesting habitat, or if the bald eagle is declared recovered and is no longer protected under the ESA.

## **NSO-Wildlife**

### **Peregrine Nest Sites**

**Stipulation:** Surface occupancy and use is prohibited within 1-mile of known Peregrine nest sites which have been active within the past seven years.

**Objective:** To protect peregrine nest sites.

**Exception:** an exception may be granted by the Authorized Officer if the operator submits a plan which demonstrates that the proposed action will not affect the peregrine or its nest site. If the Authorized Officer determines that the action may or will have an adverse effect on the species, the operator may submit a plan demonstrating that the effects can be adequately mitigated. This plan must be approved by BLM.

**Modification:** The boundaries of the stipulated area may be modified if the Authorized Officer determines that portion of the area can be occupied without adversely affecting the peregrine or its nest site.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that the entire leasehold can be occupied without adversely affecting peregrine or peregrine nest sites.

## **NSO-Riparian Management Areas**

**Stipulation:** Unless otherwise authorized, drill site construction and access through riparian management areas within this leasehold will be limited to established roadways.

**Objective:** To protect riparian vegetation and reduce erosion adjacent to water courses.

## Appendix M

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include riparian areas, flood plains, or water bodies.

**Waiver:** This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include riparian management areas (RMAs).

## Timing Limitation-Wildlife

### Raptor Nests

**Stipulation:** Surface use is prohibited from March 1 to August 1, with 1/4-mile of raptor nest sites which have been active within the past two years. This stipulation does not apply to the operation and maintenance of production facilities.

**Objective:** To protect nest sites of raptors which have been identified as species of special concern in Oregon.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that impacts from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The boundaries of the stipulated area may be modified if the Authorized Officer determines that portions of the area are no longer within 1/2-mile of raptor nests which have been active within the past two years. The dates for the timing restriction may be modified if new information indicates that the March 1 to August 1 dates are not valid for the leasehold.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that the entire leasehold no longer is within 1/2-mile of raptor nest sites which have been active within the past two years.

### Crucial Winter Range

**Stipulation:** Surface use is prohibited from December 1 to March 31 within crucial winter range

for wildlife. This stipulation does not apply to the operation and maintenance of production facilities.

**Objective:** To protect crucial deer and elk winter range from disturbance during the winter season and to facilitate long-term maintenance of wildlife populations.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that impact from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The boundaries of the stipulated area may be modified if the Authorized Officer determines that portions of the area no longer contain crucial winter range for wildlife. The dates for the timing restriction may be modified if new wildlife use information indicates that the December 1 to March 31 dates are not valid for the leasehold.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that the entire leasehold no longer contains crucial winter range for wildlife.

## Controlled Surface Use

### Soils

**Stipulation:** Prior to disturbance of slopes over 60 percent, an engineering/reclamation plan must be approved by the Authorized Officer. Such plan must demonstrate how the following will be accomplished:

- site productivity will be restored;
- surface runoff will be adequately controlled;
- off-site areas will be protect from accelerated erosion such as rilling, gully, piping, and mass wasting;
- water quality and quantity will be in conformance with State and Federal water quality laws;
- surface-disturbing activities will not be conducted during extended wet period; and
- construction will not be allowed when soils are frozen.

**Objective:** To maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, and to avoid areas subject to slope failure, mass wasting, piping, or having excessive reclamation problems.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates the effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include slopes over 60 percent.

**Waiver:** This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include slopes over 60 percent.

## **Visual Resource Management (VRM) Class II**

**Stipulation:** All surface-disturbing activities, semi-permanent, and permanent facilities in VRM Class II areas may require special design including location, painting, and camouflage to blend with the natural surroundings and meet the visual quality objectives for the area.

**Objective:** To control the visual effects of activities and facilities within acceptable levels.

**Exception:** None.

**Modification:** None.

**Waiver:** This stipulation may be waived if the Authorized Officer determines that there are no VRM Class II areas in the leasehold.

## **Seral Stage Diversity Blocks**

**Stipulation:** Unless otherwise authorized, drill site construction and access through seral stage diversity blocks within this leasehold will be limited to established roadways.

**Objective:** To protect vegetation to retain and/or restore older forests for seral stage diversity.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The area affected by this stipulation may be modified by the Authorized Officer if it is

determined that portions of the area do not include seral stage diversity blocks.

**Waiver:** This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include seral stage diversity blocks.

## **Special Recreation Management Area**

**Stipulation:** Unless otherwise authorized, drill site construction and access through special recreation management areas within this leasehold will be limited to established roadways.

**Objective:** To protect recreational qualities of the lands involved and recreational facilities as well as enhance recreational opportunities within the designated boundary of the special recreation management areas (SRMAs).

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that impacts from the proposed action are acceptable or can be adequately mitigated.

**Waiver:** This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include SRMAs.

### **Old growth Restoration and Retention Blocks**

**Stipulation:** Unless otherwise authorized, drill site construction and access through old growth restoration and retention blocks within this leasehold will be limited to established roadways.

**Objective:** To protect vegetation to retain and/or restore old growth forest.

**Exception:** An exception to this stipulation may be granted by the Authorized Office if the operator submits a plan which demonstrates that effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include old growth restoration and retention blocks.

**Waiver:** This stipulation may be waived by the Authorized Officer if it is determined that the entire

leasehold does not include old growth restoration and retention blocks.

## Habitat Conservation Areas for the Northern Spotted Owl

**Stipulation:** Unless otherwise authorized, drill site construction and access through habitat conservation areas (HCAs) within this leasehold will be limited to established roadways.

**Objective:** To protect habitat of the northern spotted owl.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include designated conservation areas.

**Waiver:** This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include designated conservation areas.

## Old Forest Stands Older Than 150 Years

**Stipulation:** Unless otherwise authorized, drill site construction and access through old forest stands older than 150 years within this leasehold will be limited to established roadways.

**Objective:** To protect older forest stands.

**Exception:** An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that effects from the proposed action are acceptable or can be adequately mitigated.

**Modification:** The area affected by this stipulation may be modified by the Authorized Officer if it is determined that portions of the area do not include older forest stands.

**Waiver:** This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include older forest stands.

## Appendix 2-EM-1a. Leasable Mineral Restrictions

Area/Value	Alternative							Remarks
	NA	A	B	C	D	E	PRMP	
Soda Mountain WSA	CD	CD	CD	CD	CD	CD	CD	
Rogue WSR (Wild Section)	CD	CD	CD	CD	CD	CD	CD	
Wild Rogue Wilderness	CD	CD	CD	CD	CD	CD	CD	
Grave Creek				NSO	NSO	NSO		
Galice Creek				NSO	NSO	NSO	NSO	
Agate Flat				NSO	NSO	NSO	NSO	
All remaining lands in recreation section of Rogue Wild Scenic River					NSO	NSO	NSO	
<b>Nominated WSR</b>								
Wild					CD	CD	CD	
Scenic						NSO		
Recreation						NSO		
Jacksonville Trail System				NSO	NSO	NSO	NSO	
<b>Areas of Critical Environmental Concern</b>								
Table Rocks	NSO	NSO	NSO	NSO	NSO	NSO	NSO	
King Mtn. Rock Garden	NSO		NSO	NSO	NSO	NSO	NSO	
Eight Dollar Mtn.	NSO		NSO	NSO	NSO	NSO	NSO	
Bill Creek				NSO	NSO	NSO		
Bobby Creek						NSO	NSO	
Cedars of Beaver Creek						NSO		
Crooks Creek				NSO	NSO	NSO	NSO	
Dakubetede						NSO		
Enchanted Forest						NSO		
Flounce Rock				NSO	NSO	NSO	NSO	
French Flat						NSO	NSO	
Hold-In-the-Rock				NSO	NSO	NSO	NSO	
Hoxie Creek						NSO	NSO	
Iron Creek					NSO	NSO	NSO	
Jenny Creek				NSO	NSO	NSO	NSO	
Larkspur						NSO		
Little Hyatt					NSO	NSO		
Moon Prairie						NSO	NSO	
PCT/Howard Prairie				NSO	NSO	NSO		
Pilot Rock				NSO	NSO	NSO	NSO	
Poverty Flats				NSO	NSO	NSO	NSO	
Rock Creek						NSO		
Rogue River				NSO	NSO	NSO		
Siskiyou Mtn. Natural Area				NSO	NSO	NSO		
Sterling Mine Ditch				NSO	NSO	NSO	NSO	
Tin Cup					NSO	NSO	NSO	
Williams Watershed						NSO		



## Appendix 2-EM-1a. Leasable Mineral Restrictions (continued)

Area/Value	Alternative						PRMP	Remarks
	NA	A	B	C	D	E		
Research Natural Areas								
Brewer Spruce	NSO		NSO	NSO	NSO	NSO	NSO	
Brewer Spruce Enlargement				NSO	NSO	NSO	NSO	
Grayback Glades				NSO	NSO	NSO	NSO	
Holton Creek						NSO	NSO	
Lost Lake				NSO	NSO	NSO	NSO	
North Fork Silver Creek				NSO	NSO	NSO	NSO	
Old Baldy				NSO	NSO	NSO	NSO	
Oregon Gulch						NSO	NSO	
Pipe Fork						NSO	NSO	
Round Top Butte			NSO	NSO	NSO	NSO	NSO	
Scotch Creek				NSO	NSO	NSO	NSO	
Woodcock Bog	NSO		NSO	NSO	NSO	NSO	NSO	
Riparian Management Areas		NSO	NSO	NSO	NSO	NSO	NSO	
Rogue WSR (Rec. Section)			NSO	NSO	NSO	NSO	NSO	
Progeny Test Sites		NSO	NSO	NSO	NSO	NSO	NSO	
R&PP Leases	NSO	NSO	NSO	NSO	NSO	NSO	NSO	
Developed Recreation Sites	NSO	NSO	NSO	NSO	NSO	NSO	NSO	
Designated Potential Recreation Sites		NSO	NSO	NSO	NSO	NSO	NSO	
Special Status Species Sites	NSO	NSO	NSO	NSO	NSO	NSO	NSO	
VRM II		X	X	X	X	X	X	
Townsend's Big Eared Bat				NSO	NSO	NSO	NSO	30-acre core
Peregrine Falcon	NSO	NSO	NSO	NSO	NSO	NSO	NSO	1/2-mile radius
Bald Eagle	NSO	NSO	NSO	NSO	NSO	NSO	NSO	radius
Bald Eagle		S	S	S	S	S	S	30-acre core
Peregrine Falcon	S	S	S	S	S	S	S	2/1 to 8/15, 1/2-mile radius
Blue Heron Nests					S	S	S	2/1 to 8/15, 1-mile radius
Spotted Owl Nests	S	S	S	S	S	S	S	3/1 to 7/1
Granitic/Schist Soils					S	S	S	3/1 to 9/30, 1/4-mile radius
Pyroclastic Soils					S	S	S	10/15 to 5/15
High Risk Watersheds					X/S	X/S	S/S	10/15 to 5/15
Special Habitats				X	X	X	X	100-300 foot buffer

## Leasing Categories:

CD: Already Closed to Leasing

NSO: No Surface Occupancy

S: Seasonal Restriction

W: Withdrawn

X: Special Stipulations



# Appendix N

## Locatable Minerals Surface Management, 43 CFR 3809 Standards for Exploration, Mining, and Reclamation

The following operational guidelines for mining activities have been compiled to assist the miner in complying with the 43 CFR 3809 regulations, which apply to all mining operations on BLM-administered land in the Medford District. The manner in which the exploratory or development work is to be done would be site-specific and all of the following standards may not apply to each mining operation. It is the mining claimant's and/or operator's responsibility to avoid "unnecessary or undue degradation," and to promptly perform all necessary reclamation work. Refer to regulations 43 CFR 3809 for general requirements. BLM will provide site-specific guidelines for some mining proposals.

### Construction and Mining

#### Required Permits

The operator must provide written notice to the District Office 15 days prior to commencement of any surface mining disturbance that requires mechanized earth moving equipment, dredges with an intake hose greater than four inches, occupancy, or cutting timber. Operations that will cause greater than five acres of surface disturbance will require the operator to submit a plan of operation 43 CFR 3809.1-6. Activities covered in the 3809 regulations under the definition for "casual use" do not require a mining notice. Any notice received and determined to be casual use shall be returned. The Oregon Department of Geology and Mineral Industries (DOGAMI) also requires application for surface mining permit (SMLR-1) for any operation disturbing more than one acre annually or 5,000 cubic yards annually. A reclamation bond will be required by either the BLM or DOGAMI. The Oregon State Division of Lands will require a permit for any relocation of flowing streams or mining within the banks of the creek if more than 50 cubic yards per year are excavated.

#### Vegetation/Timber

Timber may be cut and used for mining purposes, this may include construction of bridges and buildings, or shoring. All timber cut must be reasonably incident to mining operations 43 CFR 3712.1(a). Timber may be cut and cleared if in the way of the mining operation. A permit is required to cut and use timber on all O&C lands, 43 CFR 3821.4, except when the operator needs to clear timber that is in the way of operation. Prior to cutting timber, the claimant must submit notification in a Mining Notice or Plan of Operation.

The operator is liable for damage to government timber cut on unpatented mining claims. Therefore, it is recommended the operator submit a mining notice in advance so the BLM can arrange for removal of the timber by a qualified purchaser.

#### Firewood

Firewood permits will be issued to mining claimants who occupy the mining claim, but the permits will be limited to hardwoods or salvage timber. Firewood is for use on the claim if it is reasonably incident to ongoing mining operations. Standing merchantable conifer trees such as Douglas-fir, pine, cedar, or white fir may not be cut for firewood. The claimant must submit notification in a Mining Notice or Plan of Operation prior to cutting firewood.

#### Water Quality

When mining will be in or near bodies of water or sediment and turbid water will be discharged, the Department of Environmental Quality (DEQ) should be consulted. It is the operator's responsibility to obtain any needed permits for suction dredging, stream bed alteration, or water discharge as required by the DEQ or other state agencies. Copies of such permits shall be provided to the BLM Surface Compliance Officer when a Notice or Plan of Operations is filed. All operations, including casual

use, shall be conducted in a manner to prevent unnecessary or undue degradation and shall comply with all pertinent Federal and State laws, 43 CFR 3809.2-2.

## Claim Monuments

Due to a new state law, plastic pipe for claim staking is no longer allowed in Oregon. It is BLM policy that plastic pipes used for monuments should have all openings permanently closed. Upon loss or abandonment of the claim, all plastic pipe must be removed from the public lands. When old markers are replaced during normal claim maintenance, they are to be either wood posts, stones, or earth mounds, constructed in accordance with state law.

## Drill Sites

Exploratory drill sites should be located next to or on existing roads, when possible, without blocking public access. When drill sites must be constructed, the size of the disturbance should be as small as possible in order to conduct drilling operations.

## Dust and Erosion Control

While in operation and during periods of temporary shut-down, exposed ground surfaces susceptible to erosion would need to be protected. This can be accomplished with seeding, mulching, and installation of water diversions.

## Fire Safety

All state fire regulations must be followed including obtaining a campfire permit or blasting permit, if needed. All small gas engines must be equipped with approved spark arresters.

## Public Access

The government and its' permittees (general public) may use public lands and the surface resources on mining claims, providing they do not materially interfere or endanger prospecting, mining, or processing operations. Mining claimants shall not exclude the public from mining claims with force, intimidation, or no trespassing signs, 43 CFR 3712.1(a). Claimants are encouraged to post "caution" or "danger" signs on or adjacent to ongoing operations to inform the public of dangerous

situations. It is the operators responsibility to protect the public from mining hazards. Gates may be installed with BLM approval.

## Occupancy

Operators residing on the mining claims longer than 30 days will be required to obtain county sanitation discharge permits and other building permits required by the county. Work sites may house self-contained chemical toilets, but they must be emptied at state approved dump stations.

Solid waste (nonmining materials, trash, car bodies, etc.) is a hazard or nuisance, and accumulation of these wastes on public lands is a violation of Federal Regulation, 43 CFR 8365.1-4.

Occupancy or camping on public lands in excess of 14 days per calendar year must be reasonably incident to actual continuous mining, processing, or diligent exploration operations (core drilling or significant testing) and will require submission of a Mining Notice or Plan of Operation. In general, operations at the casual use level are not sufficient to warrant occupancy on a mining claim. During extended periods of nonoperation, the claimant shall remove all structures, equipment, and other facilities and reclaim the site, 43 CFR 3809.3-7. Some operations are seasonal and may be limited by state law. During those closure periods, the occupancy may be unnecessary since no mining may be occurring.

## Dogs

If dogs are to be present at mine sites or residences, they shall be kept under control at all times so that wildlife and the public and government personnel are not threatened. This requirement is expected of all users of public lands but is especially true where there are permanent residences.

## Suction Dredging

Excluding the wild, scenic, and recreation sections of the Rogue River, almost all streams, rivers, and flowing waters are open to suction dredging. The riverbeds of navigable waters are controlled by the Oregon Division of State Lands. The Oregon Scenic Waterways Regulations limits the size of dredges along the recreation section of the Rogue River to a maximum of four-inch intake hose.

All suction dredges must be registered with DEQ and dredges with an intake hose of greater than four inches must obtain a general National Pollutant Discharge Elimination Systems (NPDES) Permit. Operators required to have this permit must submit a Mining Notice to the BLM District Office and provide proof of having a NPDES Permit upon request.

Any dredging operation which does not exceed the four-inch intake threshold will generally result in only negligible disturbance of federal lands and therefore are considered casual use. No notification to or approval by the authorized officer is required. However, any mining operation including an occupancy exceeding 14 days will require notification or approval by the BLM.

Dredging outside the "permitted work period" established by Oregon Department of Fish and Wildlife (ODFW) will require written permission by an appropriate ODFW District Biologist.

## Reclamation

**Waste Management.** All undesirable materials (e.g., toxic subsoil, contaminated soil, drilling fluids, process residue, refuse, etc.) shall be isolated or removed or otherwise disposed of as appropriate in a manner providing for long-term stability and in compliance with all applicable state and federal requirements.

**Subsurface.** The subsurface shall be properly stabilized, holes and underground workings properly plugged, when required, and subsurface integrity ensured subject to applicable federal and state requirements.

**Site Stability.** The reclaimed area shall be stable without rill or gullies, perceptible soil movement, and slope instability; and the appropriate water courses and drainage features shall be reestablished and stabilized.

**Water Management.** The quality and integrity of affected ground and surface water shall be protected as a part of mineral development and reclamation

activities in accordance with all federal and state requirements.

**Soil Management.** Top soil, selected subsoils, or other materials suitable as a growth medium shall be salvaged from areas to be disturbed and managed for later use in reclamation. Stockpiled material shall be stabilized to prevent erosion.

**Erosion Prevention.** The surface area disturbed at any one time during development of a project shall be kept to the minimum necessary and the disturbed areas reclaimed as soon as possible (concurrent reclamation) to prevent unnecessary or undue degradation resulting from erosion.

**Revegetation/Reforestation.** When the final landform is achieved, the surface shall be stabilized by vegetation or other means as soon as practical to reduce further soil erosion from wind or water, provide forage and cover, and reduce visual impacts. Specific criteria for evaluating revegetation success must be site-specific and included as part of the reclamation plan. On lands classified as woodlot or high intensity forestlands, reclamation shall include meeting reforestation requirements of the State Forest Practices Act.

**Visual Resources.** To the extent practicable, the reclaimed landscape should have characteristics that approximate or are compatible with the visual quality of the adjacent area with regard to location, scale, shape, color, and orientation of major landscape features.

(SOURCE: BLM Manual Handbook H-3042-.1,.2)

## Road Reclamation

After mining is completed, all new roads would be reclaimed if not required for access. High walls and cut banks are to be knocked down or backfilled to blend with surrounding landscape. All culverts shall be removed from drainage crossings and the fill excavated. The roadbed shall be ripped, fertilized, seeded, and mulched, if necessary.

## Appendix 2-EM-2a. Locatable Mineral Restrictions

	Alternative							Remarks
	NA	A	B	C	D	E	PRMP	
Soda Mountain WSA		PO	PO	PO	PO	PO	PO	
Rogue WSR (Wild Section)	CD	CD	CD	CD	CD	CD	CD	
Wild Rogue Wilderness	CD	CD	CD	CD	CD	CD	CD	
Grave Creek				W	W	W		
Galice Creek				W	W	W	W	
Agate Flat				W	W	W	W	
Jacksonville Trail System				W	W	W	W	
All Remaining Lands in					W	W	W	Almeda park
Rec. Sec. Rogue WSR to								
Grave Creek								
Pickett Creek (Fish Wier Reach)					W	W	W	
<b>Nominated WSR</b>								
Wild					W	W	W	
Scenic						PO		
Recreation						PO		
<b>ACEC'S</b>								
Table Rocks	PO	PO	PO	PO	PO	PO	W	
King Mtn. Rock Garden	PO	PO	PO	PO	PO	PO	PO	
Eight Dollar Mtn.	PO	PO	PO		PO	PO	PO	
Bill Creek				PO	PO	PO		
Bobby Creek				PO	PO	PO	PO	
Cedars of Beaver				PO	PO	PO		
Crooks Creek				PO	PO	PO	PO	
Dakubetede				PO	PO	PO		
Enchanted Forest				PO	PO	PO		
Flounce Rock				PO	PO	PO		
French Flat				PO	PO	PO	PO	
Hole in the Rock				PO	PO	PO	PO	
Hoxie Creek				PO	PO	PO	PO	
Iron Creek				PO	PO	PO	PO	
Jenny Creek				PO	PO	PO	PO	
Larkspur				PO	PO	PO		
Little Hyatt				PO	PO	PO		
Moon Prairie				PO	PO	PO		
PCT/Howard Prairie				PO	PO	PO		
Pilot Rock				PO	PO	PO	PO	
Poverty Flats				PO	PO	PO	PO	
Rock Creek				PO	PO	PO		
Rogue River				PO	PO	PO		
Siskiyou Mountain Natural Area				PO	PO	PO		
Sterling Ditch				PO	PO	PO	PO	
Tin Cup				PO	PO	PO	PO	
Williams Watershed				PO	PO	PO		
Total Acres Designated: 8,108								

## Appendix 2-EM-2a. Locatable Mineral Restrictions (continued)

	Alternative							
	NA	A	B	C	D	E	PRMP	Remarks
RNA'S								
Brewer Spruce	PO	PO	W	W	W	W	W	
Brewer Spruce Enlargement				W	W	W	W	
Grayback Glades	PO	PO	W	W	W	W	W	
Holton Creek	PO	PO	W	W	W	W	W	
Lost Lake				W	W	W	W	
North Fork Silver Creek				W	W	W	W	
Old Baldy			W	W	W	W	W	
Oregon Gulch	PO	PO	W	W	W	W	W	
Pipe Fork			W	W	W	W	W	
Round Top Butte			W	W	W	W	W	
Scotch Creek			W	W	W	W	W	
Woodcock Bog	PO	PO	W	W	W	W	W	
Total Acres: 8741								
Riparian Mgmt. Areas (Alt.NA-E)/								
Riparian Reserve (PRMP)	S	S	X/S	X/S	X/S	X/S		
Rogue WSR (Rec. Section)	CD	CD	CD	CD	CD	CD	CD	
R&PP Leases	CD	CD	CD	CD	CD	CD	CD	
Developed Recreation Sites	CD	CD	CD	CD	CD	CD	CD	
Designated Potential Recreation Sites				W	W	W	W	
Areas With Special Recommended Stipulations								
Special Status Species Sites	X	X	X	X	X	X	X	
High Risk Watersheds								
VRM II				X	X	X	X	
Townsend's Big Eared Bat				NSD	W	W	NSD	1/4-Mile radius
Peregrine Falcon	NSD	NSD	NSD	NSD	W	W	NSD	1/2-Mile radius
Bald Eagle	NSD	NSD	NSD	NSD	W	W	NSD	30 Acres Core Area
Unique Ecosystems				NSD	NSD	W	W	100' Buffer
Bald Eagle		S	S	S	S	S	S	2/1 to 8/15 1/2-Mile
Peregrine Falcon		S	S	S	S	S	S	2/1 to 8/15, 1-Mile
Blue Heron Nests				S	S	S	S	3/5 to 8/15, 1/4-Mile of Nest
Spotted Owl Nests		S	S	S	S	S	S	3/1 to 9/30, 1/4-Mile
Granitic/Schist Soils					X	X	X	10/15 to 5/15
Pyroclastic Soils					X	X	X	10/15 to 5/15

## Restriction Categories:

CD: Already closed to mineral entry

NSD: No surface disturbance

PO: Plan of operation required

S: Seasonal restrictions

W: Withdraw from mineral location

X: Special management requirements



# Appendix O

## Guidelines for Development of Saleable Mineral Resources

### Quarry Design

A design would be prepared for all sites.

Due to steep terrain in the operating area, most quarry developments would require a series of benches to effectively maximize the amount of mineral materials to be removed in a safe manner. In most cases, bench height should not exceed 40 feet, and if the bench would be used by bulldozers to access other parts of the quarry, the width of the bench should be at least 25 feet. If the bench is not used by equipment, this width can be reduced to approximately 10 feet.

Clearing of timber and brush should be planned at least 10 feet beyond the edge of the excavation limit. Most often, the brush would be piled and burned at the site or scattered nearby.

If possible, all topsoil and overburden should be stockpiled and saved for eventual quarry site reclamation. These piles may need to be stabilized by mulching or seeding in order to minimize erosion during the winter months.

As a standard procedure, the excavation of the quarry floor should be designed with an outslope of approximately 2 percent in order to provide for adequate drainage of the floor. Compliance with this design should be made a requirement of all operators at the site.

### Operating Procedures

The following requirements should be made a part of every contract or permit providing for the use of mineral material sites in the planning area.

- Oversized boulders should not be wasted but would be broken and utilized concurrently with the excavated material or utilized as riprap.
- The operator would comply with local and state safety codes covering quarry operations, warning signs, and traffic control. All necessary permits must be obtained from state and county agencies.
- Use of the site for equipment storage and stockpiling rock material is allowed for the duration of the contract or permit. Use of the site beyond that time would be authorized under a special use permit.

Specific guidance for restrictions to saleable mineral development vary by alternative as listed in Appendix 2-EM-3a.



## Appendix 2-EM-3a. Saleable Mineral Restrictions

Area/Value	Alternative						Remarks
	A	B	C	D	E	PRMP	
Soda Mountain WSA	CD	CD	CD	CD	CD	NSD	
Rogue WSR (Wild Section)	CD	CD	CD	CD	CD	CD	
Wild Rogue Wilderness	CD	CD	CD	CD	CD	CD	
Grave Creek			NSD	NSD	NSD		
Galice Creek			NSD	NSD	NSD	NSD	
Agate Flat			NSD	NSD	NSD	NSD	
Jacksonville Trail System			NSD	NSD	NSD	NSD	
All remaining lands in Rec. section Rogue WSR				NSD	NSD	NSD	
<b>Areas of Critical Environmental Concern</b>							
Table Rocks	NSD	NSD	NSD	NSD	NSD	NSD	
King Mountain Rock Garden		NSD	NSD	NSD	NSD	NSD	
Eight Dollar Mountain		NSD	NSD	NSD	NSD	NSD	
Bill Creek			NSD	NSD	NSD		
Bobby Creek					NSD	NSD	
Cedars of Beaver Creek					NSD		
Crooks Creek			NSD	NSD	NSD	NSD	
Dakubetede					NSD		
Enchanted Forest					NSD		
Flounce Rock			NSD	NSD	NSD	NSD	
French Flat					NSD	NSD	
Hole-in-the-rock			NSD	NSD	NSD	NSD	
Hoxie Creek			NSD	NSD	NSD	NSD	
Iron Creek				NSD	NSD	NSD	
Jenny Creek			NSD	NSD	NSD	NSD	
Little Hyatt			NSD	NSD	NSD	NSD	
Larkspur					NSD		
Moon Prairie					NSD	NSD	
PCT/Howard Prairie			NSD	NSD	NSD	NSD	
Pilot Rock			NSD	NSD	NSD	NSD	
Poverty Flats			NSD	NSD	NSD	NSD	
Rock Creek					NSD		
Rogue River			NSD	NSD	NSD	NSD	
Siskiyou Mountain Natural Area			NSD	NSD	NSD		
Sterling Ditch			NSD	NSD	NSD	NSD	
Tin Cup			NSD	NSD	NSD	NSD	
Williams Watershed					NSD		
<b>Resource Natural Areas</b>							
Brewer Spruce	NSD	NSD	NSD	NSD	NSD	NSD	
Brewer Spruce Enlargement			NSD	NSD	NSD	NSD	
Grayback Glades			NSD	NSD	NSD	NSD	
Holton Creek			NSD	NSD	NSD	NSD	
Lost Lake			NSD	NSD	NSD	NSD	

## Appendix 2-EM-3a. Saleable Mineral Restrictions (continued)

Area/Value	Alternative						Remarks
	A	B	C	D	E	PRMP	
North Fork Silver Creek			NSD	NSD	NSD	NSD	
Old Baldy			NSD	NSD	NSD	NSD	
Oregon Gulch			NSD	NSD	NSD	NSD	
Pipe Fork					NSD	NSD	
Round Top Butte		NSD	NSD	NSD	NSD	NSD	
Scotch Creek			NSD	NSD	NSD	NSD	
Woodcock Bog	NSD	NSD	NSD	NSD	NSD	NSD	
		NSD	NSD	NSD	NSD	NSD	
<b>Riparian Management Areas (Alt. NA-E)/</b>							
Riparian Reserve (PRMP)	S	X/S	X/S	X/S	X/S	X/S	
Late Successional Reserves	X	X	X	X	X	X	
Rogue WSR (Rec. Section)	NSD	NSD	NSD	NSD	NSD	NSD	
Progeny Test Sites	NSD	NSD	NSD	NSD	NSD	NSD	
R&PP Leases	CD	CD	CD	CD	CD	CD	
Designated Recreation Sites	CD	CD	CD	CD	CD	CD	
Special Status Species Sites	X	X	X	X	X	X	
VRM I		X	X	X	X	X	
VRM II		X	X	X	X	X	
Townsend's Big Eared Bat			NSD	NSD	NSD	NSD	30-Acre core
Peregrine Falcon	NSD	NSD	NSD	NSD	NSD	NSD	1/2 Mile radius
Bald Eagle	NSD	NSD	NSD	NSD	NSD	NSD	30-Acre core
Unique Ecosystems		NSD	NSD	NSD	NSD	NSD	100' Buffer
Glendale Water Shed			NSD	NSD	NSD	NSD	
Talent Water Shed			NSD	NSD	NSD	NSD	
High Risk Watersheds						NSD	
Bald Eagle	S	S	S	S	S	S	
Peregrine Falcon	S	S	S	S	S	S	2/1 to 8/15, 1-Mile
Blue Heron Nests			S	S	S	S	3/5 to 8/15, 1/4-Mile
Spotted Owl Nests	S	S	S	S	S	S	of Nest 3/1 to 9/30, 1/4-Mile
<b>Fragile Lands</b>							
Noncommercial Woodlands				X	X	X	10/15 to 5/15

## Restriction Categories:

- W: Recommended withdraw to mineral development.  
 CD: Closed to mineral development.  
 X: Special management requirements.  
 S: Seasonal restrictions.  
 NSD: No surface disturbance.



# Appendix P

## Land Ownership Adjustment Criteria

- Improving manageability of specific areas.
- Threatened or endangered or sensitive plant and animal species habitat.
- Riparian areas and wetlands.
- Fish habitat.
- Nesting/breeding habitat for game and nongame animals.
- Key big game seasonal habitat.
- Developed recreation sites and recreation use areas.
- High quality scenery.
- Energy and mineral potential.
- Land adjacent to rivers eligible for designation under the National Wild and Scenic Rivers Act.
- Significant cultural resources and sites eligible for inclusion on the National register of Historic Places.
- Designated wilderness areas and areas being studied for possible wilderness designation.
- Accessibility of the land for public recreation and other uses.
- Amount of public investments in facilities or improvements and the potential for recovering those investments.
- Difficulty or cost of administration (manageability).
- Suitability of the land for management by another Federal agency.
- Significance of the decision in stabilizing business, social and economic conditions, and/or lifestyles.
- Whether private sites exist for the proposed use.
- Encumbrances including, but not limited to withdrawals or existing leases or permits.
- Consistency with cooperative agreements and plans or policies of other agencies.
- Suitability (need for change in land ownership or use) for purposes including but not limited to community expansion or economic development such as industrial, residential, or agricultural (other than grazing) development.



# Appendix Q

## Land Tenure Adjustment Zone 3 Lands

The following lands meet the criteria for Zone 3 lands as described in Chapter 2. They are isolated and would be difficult and uneconomical to manage and are available for disposal through exchange or sale.

- 1) T.34 S., R.6 W.  
Sec.22, NW1/4SE1/4;  
Sec.33, SW1/4SW1/4, E1/2SW1/4;  
Sec.35, NW1/4NE1/4;
- 2) T.35 S., R.5 W.  
Sec.31, SE1/4NW1/4, SW1/4, W1/2SE1/4;  
Sec.32, SW1/4NE1/4, W1/2SE1/4, NE1/4SE1/4;
- 3) T.35 S., R.6 W.  
Sec.5, S1/2NE1/4, SE1/4SW1/4, SE1/4;  
Sec.7, NE1/4NE1/4, N1/2NW1/4, SW1/4NW1/4, SE1/4NE1/4;  
Sec.11, E1/2NE1/4, SW1/4NE1/4, NE1/4SE1/4;  
Sec.14, NW1/4SE1/4;  
Sec.17, NE1/4NE1/4, NW1/4NW1/4;  
Sec.19, NE1/4, N1/2NW1/4;  
Sec.21, NE1/4NE1/4 Sec. 27, W1/2W1/2;  
Sec.29, NW1/4NW1/4;  
Sec.30, S1/2S1/4;  
Sec.31, SW1/4NE1/4, W1/2, NW1/4SE1/4;  
Sec.33, E1/2NE1/4, E1/2NW1/4, NW1/4NW1/4, SE1/4SE1/4;
- 4) T.36 S., R.3 W.  
Sec.21, NE1/4SW1/4;  
Sec.33, SW1/4SW1/4, NW1/4SE1/4SW1/4;  
Sec.35, NE1/4NE1/4;
- 5) T.36 S., R.4 W.  
Sec.25, SE1/4SW1/4, S1/2SW1/4SE1/4;  
Sec.35, Lots 1, 5, W1/2SW1/4;
- 6) T.36 S., R.5 W.  
Sec.4, E1/2NW1/4, N1/2SW1/4;  
Sec.5, SE1/4NE1/4, NE1/4SE1/4;  
Sec.29, S1/2SW1/4;  
Sec.9, W1/2E1/2, E1/2W1/2, E1/2NW1/4SW1/4;
- 7) T.36 S., R.6 W.  
Sec.1, Lots 2,3,4, S1/2NE1/4, N1/2SW1/4, SE1/4NW1/4, W1/2SE1/4,SE1/4SE1/4;  
Sec.3, SW1/4, S1/2SE1/4;  
Sec.4, W1/2W1/2;  
Sec.5, E1/2SE1/4, SW1/4NW1/4, W1/2SW1/4;  
Sec.8, W1/2SE1/4, SE1/4SE1/4;  
Sec.9, N1/2NW1/4, SW1/4NW1/4, E1/2SE1/4;  
Sec.11, NW1/4NE1/4;  
Sec.17, N1/2N1/2;  
Sec.27, SW1/4NE1/4;  
Sec.30, NW1/4SW1/4;  
Sec.31, NW1/4NW1/4;  
Sec.33, SE1/4NE1/4;8)
- 8) T.37 S., R.1 W.  
Sec.1, SW1/4SE1/4;  
Sec.10, SE1/4SW1/4;
- 9) T.37 S., R.3 W.  
Sec.4, Mineral Survey located NW1/4NW1/4;  
Sec.5, Lot 1, NE1/4NE1/4;
- 10) T.37 S., R.5 W.  
Sec.5, NE1/4NW1/4, SW1/4NW1/4, NW1/4SW1/4;  
Sec.7, W1/2SW1/4;  
Sec.18, W1/2SW1/4;
- 11) T.37 S., R.6 W.  
Sec.3, SE1/4NE1/4, NE1/4SE1/4;  
Sec.8, N1/4NE1/4;  
Sec.9, NE1/4, N1/2SW1/4, SE1/4SW1/4, W1/2SE1/4, NE1/4SE1/4;  
Sec.11, N1/2NW1/4;  
Sec.13, SW1/4SE1/4, E1/2SE1/4;  
Sec.15, NE1/4NE1/4, SW1/4NE1/4, SE1/4NW1/4;  
Sec.24, NW1/4NE1/4;
- 12) T.38 S., R.1 W.  
Sec.21, Lot 1, NE1/4SW1/4, S1/2SW1/4;
- 13) T.38 S., R.2 W.  
Sec.10, NE1/4NW1/4;

*Appendix Q*

- |  |  |
|--|--|
| 14) T.38 S., R.4 W.<br>Sec.17, NE1/4NE1/4;   | 19) T.37 S., R.1 E.<br>Sec.15, SE1/4NW1/4;                                   |
| 15) T.39 S., R.1 W.<br>Sec.1, NE1/4NE1/4;  | 20) T.38 S., R.1 E.<br>Sec.3, SW1/4NW1/4;<br>Sec.5, SE1/4NE1/4;              |
| 16) T.40 S., R.8 W.<br>Sec.1, Lots 7,8;<br>Sec.5, Lots 6, 7;<br>Sec.7, Lots 1, 2, E1/2SW1/4,W1/2SE1/4* | 21) T.33 S., R.2 E.<br>Sec.1, SE1/4SW1/4                                     |
| 17) T.32 S., R.2 E.*<br>Sec.1, SE1/4SW1/4  | 22) T.38 S., R.2 E.<br>Sec.34, SW1/4NW1/4, NW1/4SW1/4;                       |
| 18) T.36 S., R.2 E.<br>Sec.34, SE1/4SW1/4, SW1/4SE1/4;   | 23) T.39 S., R.2 E.<br>Sec.1, NW1/4NE1/4;<br>Sec.17, SE1/4NE1/4, NE1/4SE1/4; |

\* Not included on Map 2-1.



# Appendix R

## Monitoring and Evaluation of the Approved Resource Management Plan

The BLM planning regulations (43 CFR 1610.4-9) call for monitoring and evaluation of approved resource management plans (RMPs) at appropriate intervals. The purposes of monitoring the RMP are as follows:

- To ensure activities are occurring in conformance with the plan,
- To determine if activities are producing the expected results, and
- To determine if activities are causing the effects identified in the PRMP/FEIS.

### All Land Use Allocations

#### Expected Future Conditions and Outputs

Protection of SEIS special attention species so as not to elevate their status to any higher level of concern.

#### Implementation Monitoring

##### Questions:

- Are surveys for the species listed in Appendix G conducted before ground-disturbing activities occur?
- Are protection buffers being provided for specific rare and locally endemic species and other species in the upland forest matrix?
- Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens and arthropod species listed in Appendix G being protected?
- Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens and arthropod species listed in Appendix G being surveyed?
- Are high priority sites for species management being identified?

- Are general regional surveys being conducted to acquire additional information and to determine necessary levels of protection for arthropods, fungi species that were not classed as rare and endemic, bryophytes, and lichens?

#### Monitoring Requirements

- At least 20 percent of all management actions will be examined prior to project initiation and re-examined following project completion, to determine if: surveys are conducted for species listed in Appendix G, protection buffers are provided for specific rare and locally endemic species and other species in the upland forest matrix, and sites of species listed in Appendix G are protected.
- The annual program summary will address Implementation Questions 4-6.

#### Effectiveness and Validation Monitoring

##### Questions:

- Are measures taken to protect the SEIS special attention species effective?
- Is the forest ecosystem functioning as a productive and sustainable ecological unit?

#### Monitoring Requirements

- Deferred to SEIS Monitoring Plan.

### Riparian Reserves

#### Expected Future Conditions and Outputs

See Aquatic Conservation Strategy Objectives.

Provision of habitat for special status and SEIS special attention species.

where existing recreation facilities are not meeting aquatic conservation strategy objectives?

## Implementation Monitoring

### Questions:

- Are watershed analyses being completed before on-the-ground actions are initiated in riparian reserves?
- Is the width and integrity of the riparian reserves being maintained? (e.g., did the conditions that existed before management activities change in ways that are not in accordance with the SEIS ROD Standards and Guidelines and RMP management direction?)
- What silvicultural practices are being applied to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain aquatic conservation strategy objectives? Are management actions creating a situation where riparian reserves are made more susceptible to wildfire?
- Are management activities in riparian reserves consistent with SEIS ROD Standards and Guidelines, RMP management direction, and aquatic conservation strategy objectives?
- Are new structures and improvements in riparian reserves constructed to minimize the diversion of natural hydrologic flow paths, reduce the amount of sediment delivery into the stream, protect fish and wildlife populations and accommodate the 100-year flood? What effects are occurring to stream flows due to increased vegetation densities.
- A) Are all mining structures, support facilities, and roads located outside the riparian reserves?  
B) Are those located within the riparian reserves meeting the objectives of the aquatic conservation strategy?  
C) Are all solid and sanitary waste facilities excluded from riparian reserves or located, monitored, and reclaimed in accordance with SEIS ROD Standards and Guidelines and RMP management direction?
- Are new recreation facilities within the riparian reserves designed to meet, and where practicable, contribute to aquatic conservation strategy objectives? Are mitigation measures initiated

## Monitoring Requirements

- The files on each year's on-the-ground actions will be checked annually to ensure that watershed analyses were completed prior to project initiation and to ensure the concerns identified in the watershed analysis were addressed in the project's environmental assessment (EA).
- At least 20 percent of management activities within each resource area will be examined prior to project initiation and re-examined following project completion, to determine whether the width and integrity of the riparian reserves were maintained.
- The annual program summary will report what silvicultural practices are being applied in order to attain aquatic conservation strategy objectives.
- At least 20 percent of the activities that are conducted or authorized within riparian reserves will be reviewed in order to identify whether the actions were consistent with the SEIS ROD Standards and Guidelines, RMP management direction, and aquatic conservation strategy objectives. In addition to reporting the results of this monitoring, the annual program summary will also summarize the types of activities that were conducted or authorized within riparian reserves.
- All new structures and improvements within a riparian reserve will be monitored during and after construction to ensure that it was constructed to: minimize the diversion of natural hydrologic flow paths, reduce the amount of sediment delivery into the stream, protect fish and wildlife populations, and accommodate the 100 year flood.
- All approved mining plans of operations will be reviewed to determine if:  
A) both a reclamation plan and bond were required;  
B) structures, support facilities and roads were located outside of riparian reserves, or in compliance with aquatic conservation strategy objectives if located inside the riparian reserve; and  
C) and if solid and sanitary waste facilities were excluded from riparian reserves or located, monitored and reclaimed in accordance with RMP management direction.
- The annual program summary will examine the status of evaluations of existing recreational

facilities inside riparian reserves to ensure that aquatic conservation strategy objectives are met. The summary will also report on the status of the mitigation measures initiated where the aquatic conservation strategy objectives cannot be met.

## **Effectiveness and Validation Monitoring**

### **Questions:**

- Is the health of riparian reserves improving?
- Are management actions designed to rehabilitate riparian reserves effective?

## **Monitoring Requirements**

Deferred to SEIS Monitoring Plan.

## **Late-Successional Reserves**

### **Expected Future Conditions and Outputs**

Development and maintenance of a functional, interacting, late-successional and old-growth forest ecosystem in late-successional reserves.

Protection and enhancement of habitat for late-successional and old growth forest-related species including the northern spotted owl and marbled murrelet.

## **Implementation Monitoring**

### **Questions:**

- What is the status of the preparation of assessment and fire plans for late-successional reserves?
- What activities were conducted or authorized within late-successional reserves and how were they compatible with the objectives of the late-successional reserve plan? Were the activities consistent with SEIS ROD Standards and Guidelines, RMP management direction, and

Regional Ecosystem Office review requirements and the late-successional reserve assessment?

- What is the status of development and implementation of plans to eliminate or control non-native species which adversely impact late-successional objectives?
- What land acquisitions occurred, or are under way, to improve the area, distribution, and quality of late-successional reserves?

## **Monitoring Requirements**

- The annual program summary will address Implementation Questions 1-4.

## **Effectiveness and Validation Monitoring**

### **Questions:**

- Are forest management activities (e.g., special forest product harvesting) within late-successional reserves compatible with the goal of developing and maintaining a functional, interacting, late-successional and old growth forest ecosystem?
- Does the harvest of special forest products have adverse effects on late-successional reserve objectives?
- Is a functional, interacting, late-successional ecosystem maintained where adequate, and restored where inadequate?
- Did silvicultural treatments benefit the creation and maintenance of late-successional conditions?
- What is the relationship between levels of management intervention and the health and maintenance of late-successional and old growth ecosystems?

## **Monitoring Requirements**

## Adaptive Management Areas

### Expected Future Conditions and Outputs

Utilization of adaptive management areas (AMAs) for the development and application of new management approaches for the integration and achievement of ecological health, and economic and other social objectives.

Provision of well-distributed, late-successional habitat outside reserves; retention of key structural elements of late-successional forests on lands subjected to regeneration harvest; restoration and protection of riparian zones; and provision of a stable timber supply.

### Implementation Monitoring

#### Questions:

- Are the adaptive management area (AMA) plans being developed, and do they establish future desired conditions?

### Monitoring Requirements

- The annual program summary will address Implementation Question 1.

### Effectiveness and Validation Monitoring

Deferred to SEIS Monitoring Plan and individual AMA management plans.

## Matrix

### Expected Future Conditions and Outputs

Production of a stable supply of timber and other forest commodities.

Maintenance of important ecological functions such as dispersal of organisms; carryover of some species

from one stand to the next; and maintenance of ecologically valuable structural components such as down logs, snags, and large trees.

Assurance that forests in the Matrix provide for connectivity between late-successional reserves.

Provision of habitat for a variety of organisms associated with early and late-successional forests.

### Implementation Monitoring

#### Questions:

- Are suitable numbers of snags, coarse woody debris, and green trees being left following timber harvest as called for in the SEIS ROD Standards and Guidelines and RMP management direction?
- Are timber sales being designed to meet ecosystem goals for the Matrix?
- Are late-successional stands being retained in fifth-field watersheds in which federal forestlands have 15 percent or less late-successional forest?
- What is the age and type of the harvested stands?

### Monitoring Requirements

- At least 20 percent of regeneration harvest timber sales in each resource area will be examined by pre- and post-harvest (and after site preparation) inventories to determine snag and green tree numbers, heights, diameters and distribution within harvest units. The measure of distribution of snags and green trees will be the percent in the upper, middle and lower thirds of the sale units monitored. Snags and green trees left following timber harvest activities (including site preparation for reforestation) will be compared to those that were marked prior to harvest.

The same timber sales will also be inventoried pre- and post-harvest to determine if SEIS ROD and RMP down log retention direction has been followed.

- At least 20 percent of the files on each year's timber sales will be reviewed annually to determine if ecosystem goals were addressed in the silvicultural prescriptions.
- All proposed regeneration harvest timber sales in watersheds with less than 15 percent late-successional forest remaining will be reviewed

prior to sale to ensure that a watershed analysis has been completed.

- The annual program summary will address Implementation Question 4.

## Effectiveness and Validation Monitoring

### Questions:

- Are stands growing at a rate that will produce the predicted yields?
- Are forests in the Matrix providing for connectivity between late-successional reserves?

## Monitoring Requirements

Deferred to the SEIS Monitoring Plan.

## Air Quality

### Expected Future Conditions and Outputs

Attainment of National Ambient Air Quality Standards, prevention of significant deterioration goals, and Oregon Visibility Protection Plan, and Smoke Management Plan goals.

Maintenance and enhancement of air quality and visibility in a manner consistent with the Clean Air Act and the State Implementation Plan.

## Implementation Monitoring

### Questions:

- Were efforts made to minimize the amount of particulate emissions from prescribed burns?
- Are dust abatement measures used during construction activities and on roads during BLM timber harvest operations and other BLM commodity hauling activities?
- Are conformity determinations being prepared prior to activities which may contribute to a new violation of the National Ambient Air Quality Standards, increase the frequency or severity of an existing violation, or delay the timely attainment

of a standard? Has an interagency monitoring grid been established in southwestern Oregon.

## Monitoring Requirements

- At least 20 percent of prescribed burn projects will be randomly selected for monitoring to assess what efforts were made to minimize particulate emissions, and whether the environmental analysis that preceded the decision to burn addressed the questions set forth in the SEIS discussion of Emission Monitoring (pg. 3&4-100).
- At least 20 percent of the construction activities and commodity hauling activities will be monitored to determine if dust abatement measures were implemented.
- The annual program summary will address Implementation Question 3.

## Effectiveness and Validation Monitoring

### Questions:

- What techniques were the most effective in minimizing the amount of particulate emissions from prescribed burns?
- Are BLM prescribed burns contributing to intrusions into Class I areas or nonattainment areas?
- Of the intrusions that the BLM is reported to be responsible for, what was the cause and what can be done to minimize future occurrences?
- Are BLM prescribed underburns causing adverse air quality impacts to rural and down wind communities?
- Are prescribed fires decreasing the actual or potential impacts from wildfire emissions?
- Is there interagency planning, implementing and monitoring of PM10 impacts to nonattainment areas and Class I areas as part of the general and transportation conformity determinations.

## Monitoring Requirements

Deferred to SEIS Monitoring Plan.



## Water and Soils

### Expected Future Conditions and Outputs

Restoration and maintenance of the ecological health of watersheds. See Aquatic Conservation Strategy Objectives.

Improvement and/or maintenance of water quality in municipal water systems.

Improvement and/or maintenance of soil productivity.

Reduction of existing road mileage within key watersheds.

### Implementation Monitoring

#### Questions:

- Are site specific best management practices (BMPs), identified as applicable through interdisciplinary review, carried forward into project design and execution?
- What watershed analyses have been or are being performed? Are watershed analyses being performed prior to management activities in key watersheds?
- What is the status of identification of in-stream flow needs for the maintenance of channel conditions, aquatic habitat, and riparian resources?
- What watershed restoration projects are being developed and implemented?
- What fuel treatment and fire suppression strategies have been developed to meet aquatic conservation strategy objectives?
- What is the status of development of road or transportation management plans to meet aquatic conservation strategy objectives?
- What is the status of preparation of criteria and standards which govern the operation, maintenance, and design for the construction and reconstruction of roads?
- What is the status of the reconstruction of roads and associated drainage features identified in watershed analysis as posing a substantial risk?

What is the status of closure or elimination of roads to further aquatic conservation strategy objectives, and to reduce the overall road mileage within key watersheds? If funding is insufficient to implement road mileage reductions, are construction and authorizations through discretionary permits denied to prevent a net increase in road mileage in key watersheds?

- What is the status of reviews of ongoing research in key watersheds to insure that significant risk to the watershed does not exist?
- What is the status of evaluation of recreation, interpretive and user-enhancement activities/facilities to determine their effects on the watershed? What is the status of eliminating or relocating these activities/facilities when found to be in conflict with aquatic conservation strategy objectives?
- What is the status of cooperation with other agencies in the development of watershed-based Research Management Plans and other cooperative agreements to meet aquatic conservation strategy objectives? What is the status of cooperation with other agencies to identify and eliminate wild ungulate impacts which are inconsistent with attainment of aquatic conservation strategy objectives?

### Monitoring Requirements

- At least 20 percent of the timber sales and silviculture projects stratified by management category will be randomly selected for monitoring to determine whether or not best management practices (BMPs) were implemented as prescribed. The selection of management actions to be monitored will be based on beneficial uses likely to be impacted and for which BMPs are being prescribed.
- Compliance checks will be completed for all agreements entered into with providers of municipal water.
- The annual program summary will address Implementation Questions 3-11.

## Effectiveness and Validation Monitoring

### Questions:

- Is the ecosystem function of the watersheds improving?
- Are state water quality criteria being met? When state water quality criteria is met, are the beneficial uses of riparian areas protected?
- Are prescribed best management practices (BMPs) maintaining or restoring water quality consistent with basin specific state water quality criteria for protection of specified beneficial uses?

## Monitoring Requirements

Deferred to SEIS Monitoring Plan

## Wildlife Habitat

### Expected Future Conditions and Outputs

Maintenance of biological diversity and ecosystem health to contribute to healthy wildlife populations.

## Implementation Monitoring

### Questions:

- Are suitable (diameter, length and numbers) snags, coarse woody debris, and green trees being left in a manner that meets the needs of species and provides for ecological functions in harvested areas as called for in the SEIS ROD Standards and Guidelines and RMP management direction?
- Are special habitats being identified and protected?
- What is the status of designing and implementing wildlife habitat restoration projects?
- What is the status of designing and constructing wildlife interpretive and other user-enhancement facilities?

## Monitoring Requirements

- At least 20 percent of regeneration harvest timber sales in each resource area will be examined by pre- and post-harvest (and after site preparation) inventories to determine snag and green tree numbers, heights, diameters and distribution within harvest units. The measure of distribution of snags and green trees will be the percent in the upper, middle, and lower thirds of the sale units monitored. Snags and green trees left following timber harvest activities (including site preparation for reforestation) will be compared to those that were marked prior to harvest.
- The same timber sales will also be inventoried pre- and post-harvest to determine if SEIS ROD and RMP down log retention direction has been followed.
- At least 20 percent of BLM actions, within each resource area, on lands including or near special habitats will be examined to determine whether special habitats were protected.
- The annual program summary will address Implementation Questions 3 and 4.

## Effectiveness and Validation Monitoring

### Questions:

- Are habitat conditions for late-successional forest associated species maintained where adequate, and restored where inadequate?
- Are the snags, green trees and, coarse woody debris being left achieving the habitat necessary to attain the desired population at a relevant landscape level?
- Are BLM actions intended to protect special habitats actually protecting the habitat? Is the protection of special habitats helping to protect the species population?
- What are the effects of management on species richness (numbers and diversity)?



## Monitoring Requirements

Deferred to SEIS Monitoring Plan (which will address a variety of wildlife species such as amphibians, mollusks, neotropical migratory birds, etc.).

## Fish Habitat

### Expected Future Conditions and Outputs

See Aquatic Conservation Strategy Objectives.

Maintenance or enhancement of the fisheries potential of streams and other waters consistent with BLM's Anadromous Fish Habitat Management on Public Lands guidance, BLM's Fish and Wildlife 2000 Plan, the Bring Back the Natives initiative, and other nationwide initiatives.

Rehabilitation and protection of at-risk fish stocks and their habitat.

## Implementation Monitoring

### Questions:

- Are at-risk fish species and stocks being identified?
- Are fish habitat restoration and enhancement activities being designed and implemented which contribute to attainment of aquatic conservation strategy objectives?
- Are potential adverse impacts to fish habitat and fish stocks being identified?

## Monitoring Requirements

- The annual program summary will report on the status of watershed analysis to identify at-risk fish species and stocks, their habitat within individual watersheds, and restoration project needs.
- The annual program summary will report on the status of the design and implementation of fish habitat restoration and habitat activities.
- The annual program summary will report on the status of cooperation with federal, tribal and state fish management agencies to identify and eliminate impacts associated with poaching,

harvest, habitat manipulation and fish stocking which threaten the continued existence and distribution of native fish stocks inhabiting federal lands. The summary will also identify any management activities or fish interpretive and other user-enhancement facilities which have detrimental effects on native fish stocks.

- At least 20 percent of the files on each year's timber sales, and other relevant actions, will be reviewed annually to evaluate documentation regarding fish species and habitat and related recommendations and decisions in light of policy and SEIS ROD Standards and Guidelines and RMP management direction. If mitigation was required, review will ascertain whether such mitigation was incorporated in the authorization document and the actions will be reviewed on the ground after completion to ascertain whether the mitigation was carried out as planned.

## Effectiveness and Validation Monitoring

### Questions:

- Is the ecological health of the aquatic ecosystems recovering or sufficiently maintained to support stable and well-distributed populations of fish species and stocks?
- Is fish habitat in terms of quantity and quality of rearing pools, coarse woody debris, water temperature and width to depth ratio being maintained or improved as predicted?
- Are desired habitat conditions for listed, sensitive, and at-risk fish stocks maintained where adequate, and restored where inadequate?

## Monitoring Requirements

Deferred to SEIS Monitoring Plan

## Special Status and SEIS Special Attention Species Habitat

### Expected Future Conditions and Outputs

Protection, management, and conservation of federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act (ESA) and Bureau special status species policies.

Conservation of federal candidate and Bureau-sensitive species and their habitats so as not to contribute to the need to list and recover the species.

Conservation of State listed species and their habitats to assist the state in achieving management objectives.

Maintenance or restoration of community structure, species composition, and ecological processes of special status plant and animal habitat.

Protection of Bureau-assessment species and SEIS special attention species so as not to elevate their status to any higher level of concern.

### Implementation Monitoring

#### Questions:

- Are special status species being addressed in deciding whether or not to go forward with forest management and other actions? During forest management and other actions that may disturb special status species, are steps taken to adequately mitigate disturbances?
- Are the actions identified in plans to recover species being implemented in a timely manner?
- What coordination with other agencies has occurred in the management of special status species?
- What land acquisitions occurred or are under way to facilitate the management and recovery of special status species?

- What site specific plans for the recovery of special status species were or are being developed?
- What is the status of analysis which ascertains species requirements or enhances the recovery or survival of a species?
- What is the status of efforts to maintain or restore the community structure, species composition and ecological processes of special status plant and animal habitat?

### Monitoring Requirements

- At least 20 percent of the files on each year's timber sales and other relevant actions (e.g., rights-of-way, instream structures) will be reviewed annually to evaluate documentation regarding special status species and related recommendations and decisions in light of ESA requirements, policy and SEIS ROD Standards and Guidelines and RMP management direction. If mitigation was required, review will ascertain whether such mitigation was incorporated in the authorization document and the actions will be reviewed on the ground after completion to ascertain whether the mitigation was carried out as planned.
- Review implementation schedule and actions taken annually to ascertain if the actions to recover species were carried out as planned.
- The annual program summary will address Implementation Questions 3-7.

### Effectiveness and Validation Monitoring

#### Questions:

- Are trends for special status species meeting the objectives of mitigation and/or conservation actions?
- Have any Federal candidates, Bureau assessment or Bureau-sensitive species been elevated to higher levels of concern due to BLM management?
- Were desired habitat conditions for the northern spotted owl and marbled murrelet maintained where adequate and restored where inadequate?

## Monitoring Requirements

Deferred to SEIS Monitoring Plan (which will address a variety of special status species including marbled murrelet, bald eagle, northern spotted owl, anadromous fish species, etc.).

## Special Areas

### Expected Future Conditions and Outputs

Maintenance, protection, and/or restoration of the relevant and important values of the special areas which include: areas of critical environmental concern (ACECs), outstanding natural areas (ONAs), research natural areas (RNAs) and environmental education areas (EEAs).

Provision of recreation uses and environmental education in ONAs. Management of uses to prevent damage to those values that make the area outstanding.

Preservation, protection, or restoration of native species composition and ecological processes of biological communities in RNAs.

Provision and maintenance of environmental education opportunities in EEAs. Management of uses to minimize disturbances of educational values.

Retention of existing RNAs and existing ACECs that meet the test for continued designation. Retention of other special areas. Provision of new special areas where needed to maintain or protect important values.

## Implementation Monitoring

### Questions:

- Are BLM actions and BLM authorized actions/uses near or within special areas consistent with RMP objectives and management direction for special areas?
- What is the status of the preparation, revision, and implementation of ACEC management plans?
- Are interpretive programs and recreation uses being developed and encouraged in ONAs? Are

the outstanding values of the ONAs being protected from damage?

- What environmental education and research initiatives and programs are occurring in the RNAs and EEAs?
- Are existing BLM actions and BLM authorized actions and uses not consistent with management direction for special areas being eliminated or relocated?
- Are actions being identified which are needed to maintain or restore the important values of the special areas? Are the actions being implemented?
- Are protection buffers being provided for specific rare and locally endemic species and other species in the upland forest matrix?

## Monitoring Requirements

- Annually, the files on all actions and research proposals within and adjacent to special areas will be reviewed to determine whether the possibility of impacts on ACEC values was considered, and whether any mitigation identified as important for maintenance of ACEC values was required. If mitigation was required, the relevant actions will be reviewed on the ground after completion, to ascertain whether it was actually implemented.
- The annual program summary will address Implementation Questions 2-7.

## Effectiveness and Validation Monitoring

### Questions:

- Are the implemented management actions designed to protect the values of the special areas, effective?
- Are the special areas managed to restore or prevent the loss of outstanding values and minimize disturbance?

## Monitoring Requirements

- Each special area will be monitored at least every three years to determine if the values for which it was designated are being maintained.
- Each ACEC will be monitored annually to determine if proactive management actions met their objectives.

Cultural Resources Including American Indian Values

## Expected Future Conditions and Outputs

Identification of cultural resource localities for public, scientific, and cultural heritage purposes.

Conservation and protection of cultural resource values for future generations.

Provision of information on long-term environmental change and past interactions between humans and the environment.

Fulfillment of responsibilities to appropriate American Indian groups regarding heritage and religious concerns.

## Implementation Monitoring

### Questions:

- Are cultural resources being addressed in deciding whether or not to go forward with forest management and other actions? During forest management and other actions that may disturb cultural resources, are steps taken to adequately mitigate disturbances?
- What mechanisms have been developed to describe past landscapes and the role of humans in shaping those landscapes?
- What efforts are being made to work with American Indian groups to accomplish cultural resource objectives and achieve goals outlined in existing memoranda of understanding and develop additional memoranda as needs arise?
- What public education and interpretive programs were developed to promote the appreciation of cultural resources?

## Monitoring Requirements

- At least 20 percent of the files on each year's timber sales and other relevant actions (e.g., rights-of-way, instream structures) will be reviewed annually to evaluate documentation regarding cultural resources and American Indian values and decisions in light of requirements, policy and SEIS ROD Standards and Guidelines, and RMP management direction. If mitigation was required, review will ascertain whether such mitigation was incorporated in the authorization document and the actions will be reviewed on the ground after completion to ascertain whether the mitigation was carried out as planned.

- The annual program summary will address Implementation Questions 2-4.

## Effectiveness and Validation Monitoring

### Questions:

- Are sites of religious and cultural heritage adequately protected?
- Do American Indians have access to and use of forest species, resources, and places important for cultural, subsistence, or economic reasons; particularly those identified in treaties?

## Monitoring Requirements

- All cultural resource sites, where management and/or mitigation measures are utilized to protect the resource, will be monitored at least once a year to determine if the measures were effective.
- The balance is deferred to SEIS Monitoring Plan.

## Visual Resources

### Expected Future Conditions and Outputs

Preservation or retention of the existing character of landscapes on BLM-administered lands allocated for VRM Class I and II management; partial retention of the existing character on lands allocated for VRM Class III management, and major modification of the existing character of some lands allocated for VRM Class IV management.

Continuation of emphasis on management of scenic resources in selected high-use areas to retain or preserve scenic quality.

### Implementation Monitoring

#### Questions:

- Are visual resource design features and mitigation methods being followed during timber sales and other substantial actions in Class II and III areas?

### Monitoring Requirements

- Twenty (20) percent of the files for timber sales and other substantial projects in VRM Class II or III areas will be reviewed to ascertain whether relevant design features or mitigating measures were included.

### Effectiveness and Validation Monitoring

#### Questions:

- Are timber sales and other major actions in Class II and Class III areas meeting or exceeding visual resource management objectives?
- Are visual resource management objectives being met consistently, over long periods of time, in Class II management areas?

### Monitoring Requirements

- All timber sales and other selected projects in VRM Class II areas and at least 20 percent of

sales or projects in Class III areas that have special design features or mitigating measures for visual resource protection will be monitored to evaluate the effectiveness of the practices used to conserve visual resources.

- In VRM Class II management areas where two or more sales or actions have occurred, impacts will be monitored at a minimum interval of five years.

## Wild and Scenic Rivers

### Expected Future Conditions and Outputs

Protection of the outstandingly remarkable values (ORVs) of designated components of the National Wild and Scenic Rivers system through the maintenance and enhancement of the natural integrity of river-related values.

Protection of the ORVs of eligible/suitable wild and scenic rivers and the maintenance or enhancement of the highest tentative classification pending resolution of suitability and/or designation.

Protection of the natural integrity of river-related values for the maintenance or enhancement of the highest tentative classification determination for rivers found eligible or studied for suitability.

Designation of important and manageable river segments suitable for designation where such designation contributes to the National Wild and Scenic Rivers system.

### Implementation Monitoring

#### Questions:

- Are BLM actions and BLM authorized actions consistent with protection of the ORVs of designated, suitable and eligible, but not studied rivers?
- Are existing plans being revised to conform to aquatic conservation strategy objectives? Are revised plans being implemented?

### Monitoring Requirements



- Annually, the files on all actions and research proposals within and adjacent to the Wild and Scenic River corridors will be reviewed to determine whether the possibility of impacts on the outstandingly remarkable values was considered, and whether any mitigation identified as important for maintenance of the values was required. If mitigation was required, the relevant actions will be reviewed on the ground after completion, to ascertain whether it was actually implemented.
- The annual program summary report will summarize progress on preparation and revision of Wild and Scenic River Management Plans, their conformance with the aquatic conservation strategy objectives, and the degree to which these plans have been implemented.

## **Effectiveness and Validation Monitoring**

### **Questions:**

- Are the ORVs for which the Wild and Scenic Rivers were designated being maintained?
- Are the ORVs of the rivers which were found suitable or eligible but not studied, protected?

## **Monitoring Requirements**

- Each wild and scenic river will be monitored at least once a year to determine if the ORVs are being maintained.
- Each river, which was found suitable or eligible but not studied, will be monitored at least once a year to determine if the ORVs are being maintained.

## **Rural Interface Areas**

### **Expected Future Conditions and Outputs**

Consideration of the interests of adjacent and nearby rural land owners including residents during analysis planning and monitoring related to managed rural interface areas. (These interests include personal health and safety, improvements to property, and quality of life.)

Determination of how land owners might be or are effected by activities on BLM-administered land.

## **Implementation Monitoring**

### **Questions:**

- Are design features and mitigation measures developed and implemented to avoid/minimize impacts to health, life, property and quality of life, and to minimize the possibility of conflicts between private and federal land management?

## **Monitoring Requirements**

- At least 20 percent of all actions within the identified rural interface areas will be examined to determine if special project design features and mitigation measures were included and implemented as planned.

## **Effectiveness and Validation Monitoring**

### **Questions:**

- Are the rural interface area design features and mitigation measures effective in minimizing impacts to health, life, and property?

## **Monitoring Requirements**

- At least 20 percent of actions within the identified rural interface areas which had design features or mitigation measures will be examined following completion to assess the effectiveness of the action.

## Socioeconomic Conditions

### Expected Future Conditions and Outputs

Contribution to local, state, national and international economies through sustainable use of BLM-managed lands and resources and use of innovative contracting and other implementation strategies.

Provision of amenities for the enhancement of communities as places to live and work.

### Implementation Monitoring

#### Questions:

- What strategies and programs have been developed, through coordination with state and local governments to support local economies and enhance local communities?
- Are RMP implementation strategies being identified that support local economies?
- What is the status of planning and developing amenities that enhance local communities, such as recreation and wildlife viewing facilities?

### Monitoring Requirements

- The annual program summary will address Implementation Questions 1-3.

### Effectiveness and Validation Monitoring

#### Questions:

- What level of local employment is supported by BLM timber sales and forest management practices?
- What were O&C and CBWR payments to counties?

### Monitoring Requirements

Deferred to SEIS Monitoring Plan.

## Recreation

### Expected Future Conditions and Outputs

Provision of a wide range of developed and dispersed recreation opportunities that contribute to meeting projected recreation demand within the planning area.

Provision of nonmotorized recreational opportunities and creation of additional opportunities consistent with other management objectives.

### Implementation Monitoring

#### Questions:

- What is the status of the development and implementation of recreation plans?

### Monitoring Requirements

- The annual program summary will address Implementation Question 1.

### Effectiveness and Validation Monitoring

#### Questions:

- Based on the Statewide Comprehensive Outdoor Recreation Plan (SCORP) supply and demand data and public comments, is the range of recreation opportunities on BLM lands (i.e., roaded vs. unroaded) meeting public needs?
- Are BLM developed recreation facilities meeting public needs and expectations, including facility condition and visitor safety considerations?
- Are off-highway vehicle (OHV) designations adequate to protect resource values while providing appropriate motorized vehicle recreation opportunities?

### Monitoring Requirements

- Each special recreation management area (SRMA) will be monitored at least every three



years to determine if the types of recreation opportunities being provided are appropriate.

- All developed recreation sites will be monitored annually to determine if facilities are being properly managed and all deficiencies documented.
- All OHV designations will be reviewed annually to determine if revisions are necessary to protect resource values and resolve user conflicts.

## **Timber Resources**

### **Expected Future Conditions and Outputs**

Provision of a sustained yield of timber and other forest products.

Reduction of the risk of stand loss due to fires, animals, insects, and diseases.

Provision of salvage harvest for timber killed or damaged by events such as wildfire, windstorms, insects, or disease, in a manner consistent with management objectives for other resources.

### **Implementation Monitoring**

#### **Questions:**

- By land-use allocation, how do timber sale volumes, harvested acres, and the age and type of regeneration harvest stands compare to the projections in the SEIS ROD Standards and Guidelines and RMP management objectives?
- Were the silvicultural (e.g., planting with genetically selected stock, fertilization, release, and thinning) and forest health practices anticipated in the calculation of the expected sale quantity implemented?

### **Monitoring Requirements**

- The annual program summary will report both planned and nonplanned volumes sold. The report will also summarize annual and cumulative timber sale volumes, acres to be harvested, and stand ages and types of regeneration harvest for general forest management areas (GFMA), connectivity/

diversity blocks and adaptive management areas (AMAs), stratified to identify them individually.

- An annual districtwide report will be prepared to determine if the silvicultural and forest health practices identified and used in the calculation of the PSQ were implemented. This report will be summarized in the annual program summary.

## **Effectiveness and Validation Monitoring**

#### **Questions:**

- Is reforestation achieving desired stocking?
- Are stands growing at a rate that will produce the predicted yields?
- Is the long-term health and productivity of the forest ecosystem being protected in the Matrix?

### **Monitoring Requirements**

- First-, third- and fifth-year surveys will be used to determine if reforestation is meeting reforestation objectives.
- The balance is deferred to SEIS Monitoring Plan.

## **Special Forest Products**

### **Expected Future Conditions and Outputs**

Production and sale of special forest products when demand is present and where actions taken are consistent with primary objectives for the land use allocation.

Utilization of the principles of ecosystem management to guide the management and harvest of special forest products.

### **Implementation Monitoring**

#### **Questions:**

- Is the sustainability and protection of special forest product resources ensured prior to selling special forest products?

- What is the status of the development and implementation of specific guidelines for the management of individual special forest products?

## Monitoring Requirements

- The annual program summary will address Implementation Questions 1 and 2.

## Effectiveness and Validation Monitoring

### Questions:

- Are special forest products being harvested at a sustainable level?

## Monitoring Requirements

Deferred to SEIS Monitoring Plan.

## Noxious Weeds

## Expected Future Conditions and Outputs

Containment and/or reduction of noxious weed infestations on BLM-administered land using an integrated pest management approach.

Avoidance of the introduction or spread of noxious weed infestations in all areas.

## Implementation Monitoring

### Questions:

- Are noxious weed control methods compatible with aquatic conservation strategy objectives?

## Monitoring Requirements

- Review the files of at least twenty percent of each year's noxious weed control applications to determine if noxious weed control methods were compatible with aquatic conservation strategy objectives.

## Effectiveness and Validation Monitoring

### Questions:

- Are management actions effectively containing or reducing the extent of noxious weed infestations?

## Monitoring Requirements

- At least 20 percent of the noxious weed sites subjected to treatment will be monitored to determine if the treatment was effective.

## Fire/Fuels Management

## Expected Future Conditions and Outputs

Provision of the appropriate suppression responses to wildfires in order to meet resource management objectives and minimize the risk of large-scale, high intensity wildfires.

Utilization of prescribed fire to meet resource management objectives. (This will include, but not be limited to, fuels management for wildfire hazard reduction, restoration of desired vegetation conditions, management of habitat, and silvicultural treatments.)

Adherence to smoke management/air quality standards of the Clean Air Act and State Implementation Plan for prescribed burning.

## Implementation Monitoring

### Questions:

- What is the status of the preparation and implementation of fire management plans for late-successional reserves and adaptive management areas?
- Have additional analysis and planning been completed to allow some natural fires to burn under prescribed conditions?
- Do wildfire suppression plans emphasize maintaining late-successional habitat?

- Have fire management plans been completed for all at risk late-successional reserves.
- What is the status of the interdisciplinary team preparation and implementation of regional fire management plans which include fuel hazard reduction plans?

## **Monitoring Requirements**

- The annual program summary will address Implementation Questions 1-5.

## **Effectiveness and Validation Monitoring**

### **Questions:**

- Are fire suppression strategies, practices, and activities meeting resource management objectives and concerns?
- Are prescribed fires applied in a manner that retains the amount of coarse woody debris, snags, green trees, and duff at levels determined through watershed analysis?
- Are natural and human-caused fuel profiles being modified in order to lower the potential of fire ignition and rate of spread, and to protect and support land use allocation objectives by lowering the risk of high intensity, stand-replacing wildfires?

## **Monitoring Requirements**

Deferred to SEIS Monitoring Plan.



# Appendix S

## Insect and Disease Occurrence within the Medford District

As forest ecosystems become subject to increased stress factors, a variety of mortality inducing organisms that are endemic to forest stands develop the potential to accelerate mortality and to become epidemic. The following describes forest pests known to cause notable damage and/or mortality in forest types on the Medford District.

### Insects

Historical evidence indicates that drought stress often precedes beetle outbreaks in the Pacific Northwest. This association is especially noticeable in the lower elevations of the pine series forest. Overstocked stands of low vigor and stands suffering disturbance from blowdown and disease are most susceptible to beetle attack.

From a 1993 aerial survey by the Forest Pest Management of the U.S. Forest Service R6, it was estimated that approximately 25,000 acres on the district were infested with various levels of bark beetles that caused tree mortality. Most of these acres, approximately 18,000 acres, were in the Ashland Resource Area. Two types of bark beetles were responsible for a majority of the damage. These beetles, the western pine beetle (*Dendroctonus brevicornis*), and the fir engraver beetle (*Scolytus ventralis*), caused mortality in 57 percent and 34 percent of the infested areas respectively. The mountain pine beetle was responsible for tree mortality on only 8 percent of the infested acres during the 1993 survey.

Mortality of white fir in plantations during dry years near the lower elevation limits of the species appear to have resulted from a complex of causes including root pathogens, the fir engraver beetle, and drought.

There have been limited occurrences of the weevil (*Steremnius carinatus*), on the district. This weevil, whose populations tend to increase with increasing levels of untreated logging slash, can become a problem in the establishment of conifer seedlings (Condrashoff 1968).

Defoliating insects are present in forest types on the Medford District, but have not historically caused substantial damage or mortality. The western budworm and the introduced balsam woolly aphid are thought to occur within the district. In 1992, there was an occurrence of gypsy moth (*Lymantria dispar*), in the Elder Mountain area of Josephine County. This outbreak was controlled before the occurrence of significant damage. The gypsy moth is an introduced species and may cause severe defoliation on a wide range of conifer and hardwood species.

### Root Diseases

Root diseases have a broad range of hosts and are widespread throughout western Oregon forest types. Disease spread is primarily by root-to-root contact in established disease centers. However, most root pathogens have additional mechanisms for dispersal (Smith 1984; Hatfield et al. 1986). New infections and disease centers are sometimes initiated by wind-borne or insect transmitted spores.

Five root diseases account for a majority of losses from disease in southwestern Oregon. They are Armillaria root disease, annosus root disease, laminated root rot, Port-Orford cedar root disease, and black stain disease.

- Armillaria root disease (*Armillaria ostoyae*) is the most frequently encountered root disease in southwestern Oregon (Hatfield 1986). Armillaria root disease severity on conifer species is known to be related to drought and other stress factors (Reaves et al. 1988) and differs with host and geographic location (Smith 1984). In the Pacific Northwest, Armillaria root disease primarily causes mortality in 10 to 25-year-old Douglas-fir plantations west of the Cascade Range (Hatfield et al. 1986).
- Annosus root disease (*Heterobasidion annosum*), can infect most conifer species in southwestern Oregon. Western hemlock, white fir, California red fir, and grand fir are seriously effected (Hatfield 1986). Wounds on trees provide entry for the

pathogen which then spreads from tree to tree through root grafts. Root and stem decay is the result of infection.

- Laminated root rot (*Phellinus weirii*), causes large losses of Douglas-fir, white fir, and grand fir in eastern Jackson County (Hatfield 1986). Goheen (1979) reported a loss of 73 cubic feet/acre/year in a white fir/Douglas-fir stand near Hyatt Lake. The largest concentrations of this root rot on the Medford District are in the Hyatt Lake-Howard Prairie area and on Skeleton Mountain.
- Port-Orford cedar root disease, caused by *Phytophthora lateralis* is an introduced pathogen and is a threat to Port-Orford cedar throughout its range. The disease is spread by root contact between infected trees, by waterborne spores, or by resting spores found in soil on vehicles and equipment. It is most commonly found in riparian areas that contain Port-Orford cedar within the Grants Pass and Glendale resource areas.
- Black stain (*Leptographium wageneri*), is a vascular wilt that causes mortality of infected trees. Douglas-fir is the most susceptible conifer in this region. Ponderosa and lodgepole pines and western hemlock are somewhat susceptible to the pathogen. Seldom killed are western white pine and mountain hemlock. Most mortality occurs in Douglas-fir stands less than 30 years old. A survey conducted by Hessburg et al. (1989) to evaluate black stain incidence and severity in 10-to-30 year-old Douglas-fir plantations on the Medford District

found that nearly 19 percent of all Douglas-fir plantations contained trees infected with the disease. Incidence of the disease appears to be highly associated with roads and major skid trails. Hessburg et al. (1989) reported that increased damage severity appears to be highly associated with increasing site disturbance and tree injury. Mortality from blackstain in stands older than 30 years is uncommon.

## Stem Canker Diseases

- White pine blister rust (*Cronartium ribicola*), is an important stem canker disease of sugar pine and western white pine in southwestern Oregon. Growth loss and mortality can result from infection. This introduced pathogen completes its life cycle on these pines with (*Ribes*) species as the alternative host.

## Dwarf Mistletoes

- Douglas-fir mistletoe (*Arceuthobium douglasii*), and dwarf mistletoes, which infect other conifer species, are endemic to the Medford District. Dwarf mistletoe species cause damage such as growth loss, reduced wood quality, top kill, and tree mortality. *Arceuthobium abietinum* infects true firs on the district and has become more common as management practices have allowed true fir to increase in the understories of many stands.

# Appendix T

## Timber Supply Analysis For BLM Planning

### Background

In 1992, the USDI Bureau of Land Management released draft environmental impact statements (EISs) for the Coos Bay, Eugene, Medford, Roseburg, Salem, and Klamath Falls Resource Area - Lakeview District Draft Resource Management Plans. These drafts included a comprehensive analysis of timber supply in western Oregon. The analysis covered a period of initial plan implementation (1991-2000) and the period thereafter (2001-2010). The baseline period that provides a historical benchmark for comparison was 1984-1988.

Details of the original analysis are described in the draft EISs (Anonymous, 1992). Regional stumpage price results were used to calculate price changes for the assessment of personal income, employment, and population effects. Harvest and log consumption results are presented in chapter 4.

### Key Concepts

Implemented on all Districts, each set of similar resource management plan alternatives represented a different timber supply policy, or alternative theme, for USDI Bureau of Land Management (BLM) administered lands in western Oregon. The question being addressed by this analysis is how do changes in BLM timber supply policy affect how much timber is harvested and consumed in various parts of western Oregon? Western Oregon was divided into subregions that differed in ownership distribution, private timber availability, and silvicultural management, while at the same time served as logical reporting areas for western Oregon BLM Districts. Changes in one subregion could affect another through the transportation of logs from harvest origin to processing destination. The analysis recognized that the BLM is just one timber supplier within western Oregon and that the impact of harvest changes is felt where the timber is actually consumed. The amount of timber offered for sale by the BLM affects stumpage price. In turn, stumpage price influences private timber harvest. The lower the BLM sale quantity, the higher stumpage prices, and the higher the level of private timber harvest.

Timber demand is determined by factors outside the control of the BLM such as housing starts and other national economic variables like gross domestic product and the interest rate. Year to year fluctuations in timber demand were averaged over a 10 year period. Timber supply is determined by ownership, location, and stand condition. Ownership determines the policy specifying the conditions under which the timber may be harvested. Location accounts for variations in species composition and the amount of timber available for harvest. Stand condition measures the amount of harvestable volume available on a per acre basis, as well as the growth rate and stage of development of this volume. Private timber harvest is directly proportional to stumpage prices. This analysis accounted for changes in private timber supply by assessing inventory conditions at the beginning of each analysis period. For public agencies such as the USDA Forest Service and the BLM, timber supply is fixed at the planned allowable sale quantity; regardless of the stumpage price.

Market equilibrium defines a balance between timber supply and demand: the amount of timber harvested equals the amount of timber consumed at the market clearing price. Implementing a new BLM timber policy will disrupt this balance and leads to adjustments in the stumpage price such that a new timber supply and demand balance is created. In this analysis, market equilibrium is explicitly recognized for the Pacific Northwest - westside region, and this implies a local equilibrium within each western Oregon subregion.

### Updated Procedures

As was the case in 1992, the analysis consisted of the following steps for the 1991-2000 period<sup>1</sup>: (1) regional market equilibrium, (2) disaggregation of the private harvest, (3) timber harvest by ownership, (4) reapportioning harvest into log consumption; and for the 2001-2010 period, (5) updating the private inventory, projecting the private harvest, and re-estimating log consumption.

Timber Assessment Market Model (TAMM) (Adams and Haynes 1980, Haynes 1990) run<sup>2</sup> results for the 1992 analysis indicated a linear relationship between



private timber supply and BLM alternative sale quantity (Anonymous, 1992). This analysis relied on interpolating the results from two updated TAMM runs representing Federal timber supply levels of 187 million cubic feet per year (mmcf/year) and 322 mmcf/year respectively. The first run<sup>1</sup> corresponds to the Resources Planning Act (RPA) base run used to evaluate the Forest Plan for "Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl". The second run<sup>2</sup> represented an arbitrarily set higher level of Federal timber supply. The interpolations were based on changes in the BLM share of the Pacific Northwest - westside Federal timber supply for the alternative theme being analyzed. National Forest harvest levels were held at their level in the 1994 RPA base run (93 mmcf/year). The other public harvest for the Pacific Northwest - westside supply region was left unchanged at 147 mmcf/year.

When compared to the base run used in the 1992 analysis<sup>3</sup>, the April 1994 RPA TAMM base run included several updates relevant to the Pacific Northwest - westside supply region<sup>4</sup>. The most relevant was an overall reduction in private timber supply due to inventory updates. This had the effect of lowering TAMM's estimate of private growing stock removals given similar policy and economic conditions used in the 1992 analysis. Other TAMM updates included revisions in historical input data for revised estimates of the proportion of sawtimber volume from growing stock removals. Observed harvest values for the years 1991 and 1992 replaced estimates used in the 1992 analysis.

The procedures and assumptions used to complete steps (2) - (5) above remained the same as those used in the 1992 analysis (see Anonymous, 1992).

## Results and Discussion

Results are presented in Tables 1-3. When compared with the 1992 analysis, the results indicate an overall lower level of private timber supply under higher stumpage price levels. The higher stumpage

prices reflect the markedly lower level of timber supply from National Forests. In the 1992 analysis, National Forests were held at a supply level of 240 mmcf/year (consistent with their proposed plan modifications under the Interagency Scientific Committee conservation strategy for the northern spotted-owl). However, under implementation of the President's Forest Plan, the National Forest timber supply is reduced to 93 mmcf/year. In spite of this price increase, the level of private harvest is lower than estimated in the 1992 analysis. This reflects the private inventory updates in TAMM.

When compared to the 1984-1988 baseline, the private harvest under each BLM alternative theme increases over 1991-2000. This can be attributed to increases from the non-industrial private ownership. Comparison of the 2001-2010 projections with the 1991-2000 harvest disaggregation shows a dramatic increase in the total private harvest, over 130 million cubic feet per year. One important qualification for this harvest gain is that pre-1990 forest practice rules and related environmental constraints on the private timberlands remain unchanged through 2010. Therefore, these increases may not be entirely attainable given recent changes in Oregon forest practice regulations for stream protection and proposed conservation restrictions on private lands for the marbled murrelet, northern spotted owl, and possibly coho salmon.

Western Oregon was a net importer of logs over the 1984-1988 period as total consumption exceeds harvest. This was not allowed to vary in this analysis. Differences in log consumption across BLM resource management plan alternatives were less noticeable given the large share of timber harvest still forthcoming from all other ownerships. For all BLM resource management plan themes, log consumption in western Oregon is projected to decrease when compared to the 1984-1988 baseline period. Most of this decrease is from reduced National Forest allowable timber sale quantities under the President's Forest Plan and TAMM reductions in private timber availability. Private harvest increases in the 2001-2010 period translate into higher levels of consumption for this period.

<sup>1</sup> See Anonymous (1992) for a detailed description of each step.

<sup>2</sup> TAMM90 log runs 582, 583, 584, and 587.

<sup>3</sup> Timber Assessment Market Model - 1993 Montana Version, LR-207 (RPA-Base, 4/14/94).

<sup>4</sup> Timber Assessment Market Model - 1993 Montana Version, Log Run CT2, June 24, 1994.

<sup>5</sup> TAMM90, Log-Run 581, April 9, 1992.

<sup>6</sup> R. Haynes, and J. Mills. Social and Economic Values Research Program, USDA Forest Service, Pacific Northwest Research Station, Portland Forestry Sciences Laboratory, PO Box 3690, Portland, Oregon, 97208.

Table 1: Regional market equilibrium results by BLM resource management plan theme

Bureau of Land Management		Timber Supply Analysis Results	
Resource	Allowable	1991-2000	1993-2000
Management Plan Theme	Sale Quantity (mmcf/year)	Regional Stumpage Price (1982 \$/mbf)	Western Oregon Private Growing Stock Removals (million cubic feet per year)
1984-1988 Historical	199	\$112.42	602
No Action	187	\$255.63	618
A	250	\$250.41	610
B	224	\$252.53	613
C	67	\$266.05	635
D	74	\$264.94	633
E	56	\$267.07	637
PRMP	35	\$268.86	640
TAMM LR-207	94	\$263.64	631
TAMM LR-CT2	136	\$251.85	612

mbf - thousand board feet, long log scale.  
 mmcf/year - million cubic feet per year.

Table 2: Results for the 1993-2000 private harvest disaggregation and 2001-2010 harvest projections

Private Harvest, Western Oregon (million cubic feet per year)						
BLM Resource Management Plan Theme	1993-2000			2001-2010		
	IND	NIPF	TOTAL	IND	NIPF	TOTAL
PRMP (BLM ASQ = 35)	465	175	640	558	213	771
No Action (BLM ASQ = 187)	449	169	618	549	208	757
Alternative A (BLM ASQ = 250)	443	167	610	545	206	751
Alternative B (BLM ASQ = 224)	446	168	614	547	207	754
Alternative C (BLM ASQ = 67)	461	174	645	556	212	768
Alternative D (BLM ASQ = 74)	460	174	634	555	211	766
Alternative E (BLM ASQ = 56)	462	175	637	556	212	768
Timber Availability <sup>(1)</sup> (BLM ASQ = 190)	544	125	669	557	125	682
	IND	NIPF	TOTAL			
1984-1988 Baseline (BLM Harvest = 202)	525	77	602			

NOTE: PRMP - Proposed Resource Management Plan  
 IND - Private industrial ownership.  
 NIPF - Private non-industrial ownership.  
 BLM ASQ - Bureau of Land Management resource management plans cumulative allowable sale quantity for western Oregon (million cubic feet per year). Includes the Klamath Resource Area of the Lakeview District.  
 BLM Harvest - Bureau of Land Management actual harvest (million cubic feet per year).

<sup>(1)</sup> Sessions, John, coordinator. 1990. Timber for Oregon's tomorrow. The 1989 update. Corvallis, OR. Oregon State University, College of Forestry, Forest Research Lab. 183 p.

Table 3. Log consumption results by BLM resource management plan theme

Log Consumption by Western Oregon Processing Facilities (million cubic feet per year)								
BLM Resource Management Plan Theme	1993-2000				2001-2010			
	HARV	END CNSMP	EXOG CNSMP	TOTAL CNSMP	HARV	END CNSMP	EXOG CNSMP	TOTAL CNSMP
PRMP	797	761	97	858	928	882	97	979
No Action	929	890	98	987	1,067	1,018	98	1,115
Alternative A	982	942	97	1,039	1,123	1,072	97	1,170
Alternative B	961	922	97	1,019	1,101	1,051	97	1,148
Alternative C	825	789	97	886	958	911	97	1,008
Alternative D	831	794	97	892	964	917	97	1,014
Alternative E	816	779	97	876	947	900	97	997
	HARV	END CNSMP	EXOG CNSMP	TOTAL CNSMP				
1984-1988 Baseline	1,248	1,196	98	1,294				
NOTES: PRMP - Proposed Resource Management Plan HARV - Total harvest from all ownerships within western Oregon (million cubic feet per year). END CNSMP - Consumption of logs originating from ownerships within western Oregon (million cubic feet per year). The difference between HARV and END CNSMP represents the volume of timber originating in western Oregon, but processed by out-of-state or eastern Oregon mills. EXOG CNSMP - Consumption of logs originating from ownerships from eastern Oregon and out-of-state (million cubic feet per year). Differences reflect the effect of implementing different BLM resource management plan alternatives on Klamath Resource Area of the Lakeview District in eastern Oregon. TOTAL CNSMP - Total log consumption (all origins) by western Oregon processing facilities (million cubic feet per year).								



## Appendix U

### Cumulative Effects Analyses for Small Watersheds of Concern

The resource management plan (RMP) cumulative effects analysis for representative watersheds may not reflect concerns in small watersheds (generally 1,000 to 7,000 acres). Small watersheds suspected of having a high level of cumulative effects have been identified on the Medford District through previous environmental assessment scoping and current information gathered from recent aerial photos or visual observations. For the RMP, these watersheds are analyzed for cumulative effects.

The Medford District's environmental assessment process includes an intensive method of analyzing watershed cumulative effects for small project level watersheds. This method utilizes the management

history for all land (BLM and non-BLM) within the project level watershed to evaluate hydrologic condition of the watershed based on equivalent clearcut area, compacted area, and openings in the transient snow zone. Information on the watershed sensitivity (beneficial uses, slope stability, soil erodibility, hydrologic response, and channel stability) is combined with the hydrologic condition to determine existing and potential adverse cumulative effects on water and soil resources.

The following small watersheds are identified as having high levels of cumulative effects based on results from the intensive watershed analysis and the watershed condition index analysis used in the RMP.

Table U-1. Areas With Cumulative Effects Concerns

Analytical Watershed	Subwatershed	BLM Acres	Area of Concern
Big Butte Creek	Clark Creek	2,203	Clark Creek
Deer Creek	White Creek	1,948	White Creek
Elk Creek	Middle Elk Creek	7,486	Alco-Middle Flat Creek Miller-Jones Yellow Rock
Evans Creek	East Fork Evans Creek	557	Spriggett Creek
	Upper West Fork Evans Creek	3,059	West Fork Evans Headwaters West Skeleton Mountain Ash Flat
	Rock/Salt Creeks	1,397	Cold Creek
Grave Creek	Upper Grave Creek	3,155	Upper Grave Creek Grave-Boulders
Jenny Creek	Keene Creek	1,083	Parsnip-Keene
Jumpoff Joe Creek	Upper Jumpoff Joe Creek	3,382	Orofino-Joe Fall-Joe Daisy-Joe
	Louse Creek	4,271	Upper Louse Creek
Little Butte Creek	Lake Creek	984	Upper Lake Creek
Lost Creek	Upper Lost Creek	1,825	Vine Maple
	Lower Lost Creek	1,608	Lost-Floras
North Fork Silver Creek	North Fork Silver Creek	8,323	North Fork Silver Creek
Rogue-Wild Section	Missouri Creek	3,534	Missouri-Trout
Williams Creek	West Fork Williams Creek	2,936	Lone-Goodwin



Past management activities in the Clark Creek watershed have resulted in a high level of harvest, a large amount of compacted area due to roads and tractor skid roads, and a large amount of nonrecovered openings in the transient snow zone. These factors place the Clark Creek watershed at risk for water quality degradation.

High harvest levels over the past 20 years in addition to high road densities contribute to White Creek watershed being identified as having a high level of cumulative effects.

Areas of concern in the Middle Elk Creek subwatershed include Alco-Middle, Flat Creek, Miller-Jones, and Yellow Rock. The area on the east side of Middle Elk Creek subwatershed experienced a severe wildfire in 1988. Harvest in the burnt area on private land was accomplished primarily using tractor yarding, which contributed to a high surface-disturbance index and low levels of vegetative cover. The vegetation index is also adversely effected by the large amount of area categorized as pasture land and disturbed agricultural land. Riparian vegetation was also adversely impacted by the wildfire and associated salvage logging. Both slope and drainage density indices are high, indicating efficient removal of basin precipitation and high potential for erosional energy. DEQ's statewide assessment report identifies the main stem of Elk Creek as having a moderate stream problem rating for water quality conditions effecting fish and drinking water supplies and stream quality conditions effecting aquatic habitat. Pollution concerns listed for Elk Creek include turbidity and streambank erosion. Probable causes identified in the assessment report are landslides, surface erosion, elimination of stream thermal cover, vegetation removal, and road location. Flat Creek, in the Middle Elk Creek subwatershed, is identified as having a moderate stream problem rating for water quality condition effecting fish and stream quality conditions effecting aquatic habitat. Observed pollution concerns listed by DEQ for Flat Creek are turbidity, sedimentation, low flow, low dissolved oxygen, and streambank erosion. Probable causes identified by DEQ are the same as those listed for Elk Creek.

Areas of concern in Evans Creek have soils that are highly erodible and formed from decomposed schist and/or granitic parent material. These areas have experienced large amounts of harvesting over the past 20 years and the amount of compacted area due to roads and skid roads is high. Stream channel stability is rated poor to fair due to the steep, granitic sideslopes. These watersheds have a high potential for water quality degradation due to increased

sediment resulting from past management activities. The DEQ 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution rates West Evans Creek as having moderate stream problems due to turbidity and sediment. All areas of concern listed for Evans Creek except Sprignett Creek are in West Fork Evans Creek.

The areas of concern in Grave Creek have adverse effects from wildfires, mining operations, and high harvest levels over the past 20 years. There are a considerable amount of skid roads and unsurfaced roads predominantly on private timberlands. Channels are in fair condition due to sediment deposits and lack of riparian vegetation. The DEQ Nonpoint Source (NPS) Assessment report rates Grave Creek (downstream of these small headwater tributaries) as having moderate stream problems due to turbidity and sediment.

The small watershed encompassing Parsnip Lakes has been heavily logged primarily on private timberland over the past five years. Ground-based yarding systems were used resulting in high amounts of compacted area. Increased sediment deposits have been observed in one of the lakes.

The areas of concern in Jumpoff Joe Creek have adverse effects from mining activity as well as logging over the past 20 years. A high percentage of these watersheds is compacted due to skid, jeep, and haul roads. Upper Louse Creek watershed consists of highly erodible granitic soils. Stream condition is poor with little or no gravel beds for fish spawning. Jumpoff Joe Creek below the upper watershed is rated by the DEQ NPS assessment report as having moderate stream problems due to turbidity and sediment.

Soils in the Upper Lake Creek area of concern are predominantly derived from deeply weathered pyroclastic parent materials and are highly susceptible to soil creep and slumping. A high level of harvest activity has occurred in this area over the past 20 years. Stream condition is fair due to sediment deposits.

The Vine Maple and Lost-Floras areas of concern exhibit high levels of adverse cumulative effects resulting from past management activities. A large portion of the Vine Maple watershed has nonrecovered openings in the transient snow zone. Both Vine Maple and Lost Floras watersheds have a high percentage of compacted area.

The lower half of North Fork Silver Creek watershed experienced a severe wildfire in 1987 and,

consequently, levels of vegetative cover are low. The majority of the intense burning occurred on Forest Service land. Rock outcrops and shallow soils exist in portions of the watershed resulting in naturally nonforested areas that contribute to a high vegetation index factor. Revegetation has been poor on some old harvest units due to rocky, nitrogen deficient or nutrient imbalanced soils. Recent timber harvest levels have been high and there is a fairly high level of soil disturbance. The riparian vegetation condition in the upper watershed is fairly good, although the vegetation is predominantly hardwoods with little conifer component due to past harvesting in riparian zones. Steep slopes, high rainfall amounts, and high streamflows also contribute to a high. DEQ's statewide assessment of nonpoint sources of water pollution (DEQ 1988a) identifies the lower portion of North Fork Silver Creek as having a moderate stream problem rating for water quality conditions affecting

fish. Specifically, the assessment report mentions the adverse effect on cold water fish resulting from elimination of stream thermal cover from the 1987 wildfire.

The Missouri-Trout area of concern in the Missouri Creek subwatershed has fairly high levels of harvest and nonrecovered openings in the transient snow zone. Road densities and percentage of compacted area are high. These adverse watershed conditions result in a high level of cumulative effects and the potential for water quality degradation.

The Lone-Goodwin area of concern consists of highly erodible granitic soils. Past management activities resulted in high harvest levels, large amounts of compacted area, fairly high percentage of nonrecovered openings in the transient snow zone, and very high road densities.

## Appendix V

# Comments and Responses

Volume 3 is a collection of comments that were received on the Medford Draft RMP/EIS. During the 120-day comment period, which extended from August 21, to December 21, 1992, the district received 1,446 comment letters. The comments taken from various letters have been paraphrased

and we have included the responses given for that topic or question. These are not all of the comments received, but every effort was made to accurately capture and display the "substantive" comments. Comments are grouped by topic with a table of contents available for locating subjects.



## Appendix W

### Comment Letters

Due to the volume of comments received, only letters from government agencies, elected officials, and Native American groups were reproduced. This does not imply lesser importance of letters received from non-governmental individuals and groups.

See Volume 3.



# Appendix X

## Reasonable Foreseeable Mineral Development

### Leasable Energy Minerals

#### Assumptions for Oil and Gas Activity

Based on past oil and gas drilling in the Medford District, reasonably foreseeable oil and gas activity in the area are not expected to be significant within the 10- to 15-year duration of the Resource Management Plan (RMP). It is anticipated that oil and gas activity would consist of the issuance of some competitive and over-the-counter leases, a few geophysical surveys, and perhaps the drilling of one or two exploratory holes.

Because of the low potential for the development of hydrocarbons, we do not anticipate the discovery of a producible oil and gas field in the Medford District during the period covered by the RMP. However, to comply with the Supplemental Program Guidance for Fluid Mineral (Manual Section 1624.2), the potential surface impacts associated with the discovery and development of a small oil field are outlined in the section titled "Oil and Gas Exploration and Development Scenario."

#### Oil and Gas Exploration and Development Scenario

##### Exploration Scenario

- One or two exploration holes would be drilled over the life of the RMP (10-15 years).
- Exploratory drilling is most likely to be conducted within those parts of the district classified as "High." This is the highest level of potential for oil and gas in the Medford District.
- The average area needed for each drill pad would be two acres. An additional two acres would be needed for support facilities.
- The average length of road constructed for each drill hole would be .25 miles.

- The roads would have a gravel surface with an average width of 20 feet. The total surface disturbance width would average 40 feet with ditches, cuts, and fill.
- Each well would be drilled over a period of less than 12 months.

##### Surface Impacts of Exploration

- The total area required for drill pads and support facilities would be eight acres.
- The total area required for roads would be three acres.
- The total surface disturbance caused by exploratory drilling over the life of the plan would be 11 acres.

#### Field Development and Production Scenario

- Small deposits of oil or gas discovered in the Medford District would not be economically feasible to develop. The minimum size that would be economic is a field containing reserves 50-60 Bcf of gas over a productive lifespan of 10 years.
- One field of minimum size could be discovered within the Medford District during the life of the RMP.
- Total area of the field would be 200 acres and well spacing could be 160 acres. The field would require four development wells in addition to the discovery well.
- Each development would require .25 miles of road. Development of well access roads would be graveled and would have a surface width of 20 feet. The width of the surface disturbance for pipelines would average 30 feet. Any oil production would be trucked to refineries outside Oregon.
- All well service requirements would be provided by established service companies.



## Surface Impacts of Field Development and Production

- The total surface disturbance for well pads would be eight acres.
- The total surface disturbance for roads would be five acres.
- The total surface disturbance caused by development of the field would be 13 acres.
- The total surface disturbance caused by pipelines would be 600 acres.
- The total surface disturbance caused by exploration and development over the life of the plan would be 671 acres.

## Locatable Mineral Resources

### Future Trends and Assumptions

The major commodities of interest would continue to be the precious metals, gold, and silver. This is based on a combination of price (especially gold) and the favorable geology for mineral occurrence. Reclamation science would continue to advance due to experience and research. More detailed design effort would be placed on the reclamation of mined lands in the future. This would result in an overall increase in reclamation costs but those costs should pay dividends in the long term with increased reclamation success.

The economics of mining in the planning area would be driven by the relationship between production costs and the market price of the commodity. While production costs can be controlled or anticipated through management and technology, the big unknown would be in the price of the mineral commodity, especially gold. The overall profitability of an operation and hence the level of activity at the prospecting, exploration, and mining phases for development of ore bodies would be closely related to the price of the mineral commodity.

## Background on the Development of a Locatable Minerals Mine

The development of a mine from exploration to production can be divided into four stages. Each stage requires the application of more discriminating (and more expensive) techniques over a successively smaller land area to identify, develop, and produce an economic mineral deposit. A full sequence of developing a mineral project involves reconnaissance, prospecting, exploration, and mine development.

### Reconnaissance

Reconnaissance level activity is the first stage in exploring for a mineral deposit. This activity involves initial literature search of an area of interest, using available references (such as publications, reports, maps, aerial photos, etc.). The area of study can vary from hundreds to thousands of square miles. Activity that would normally take place includes large scale mapping, regional geochemical and geophysical studies, and remote sensing with aerial photography or satellite imagery. These studies are usually undertaken by academic or government entities or major corporations. The type of surface-disturbing activity associated with reconnaissance level mineral inventory is usually no more than occasional stream sediment or soil and rock sampling. Minor off-highway vehicle (OHV) use may be required.

### Prospecting

Reconnaissance identifies prospecting areas of interest that contain anomalous geochemical or geophysical readings, unique geologic structures or features, occurrence of typical mineral bearing formations, or a historical reference to past mineral occurrence. This area may range from a single square mile to an entire mountain range of several hundred square miles.

Locating a mineral prospect includes more detailed mapping, sampling, and geochemical and geophysical study programs. Also this is the time when property acquisition efforts usually begin and most mining claims are located in order to secure ground while trying to make a mineral discovery. Prospecting on an annual basis is considered a minimum requirement under the mining laws to secure a claim.

Types of surface-disturbing activity associated with prospecting would involve more intense soil and rock chip sampling using mostly hand tools, frequent OHV use, and placement and maintenance of mining claim monuments. This activity is normally considered "casual use" (43 CFR 3809.1-2) and does not require BLM notification or approval.

## Exploration

Upon location of a sufficiently anomalous mineral occurrence or favorable occurrence indicator, a mineral prospect is established and is subjected to more intense evaluation through exploration techniques. Activities that take place during exploration include those utilized during prospecting but at a more intense level in a smaller area. In addition, activities such as road building, trenching, and drilling are conducted. In later stages of exploration, an exploratory adit or shaft may be driven. If the prospect already has underground workings, these may be sampled, drilled, or extended. Exploration activities utilize mechanized earth moving equipment, drill rigs, etc., and may involve the use of explosives.

Typical exploration projects in the planning area include: in-stream dredging with portable suction dredges, exploratory drilling which may include construction of new roads, use of explosives to sample rock outcroppings, and excavation of test pits in bench placer deposits. If initial results are encouraging and the exploration project disturbs five acres or less, it is conducted under a Notice (43 CFR 3809.1-3) which requires the operator to notify BLM 15 days before beginning the activity. A copy of each notice received is sent to the Oregon Department of Geology and Mineral Industries for review. If the project disturbs more than five acres, it is conducted under an approved Plan of Operations (43 CFR 3809.1-4).

## Mine Development

If exploration results show that an economically viable mineral deposit is present, activity would intensify to obtain detailed knowledge regarding reserves, possible mining methods, and mineral processing requirements. This would involve applying all the previously utilized exploration tools. When enough information is acquired, a feasibility study would be made to decide whether to proceed with mine development and what mining and ore processing methods would be utilized.

When the decision to develop the property is made, the permitting process begins. Upon approval, work begins on development of the mine infrastructure. This includes construction of the mill, offices, and laboratory; driving of development workings if the property is to be underground mined or prestripping if it is to be open pit mined; and building of access roads or haulage routes and placement of utility services. During this time additional refinement of ore reserves is made.

When enough facilities are in place, actual mine production begins. Concurrent with production there often are "satellite" exploration efforts to expand the mine's reserve base and extend the project life. Reclamation of the property is conducted concurrently with, or upon completion of, the mining operation. Often subeconomic resources remain unmined and the property is dormant waiting changes in commodity price or production technology that would make these resources economic.

Activities that occur on these lands include: actual mining; ore processing; tailing disposal; waste rock placement; solution processing; metal refining; and placement of support facilities such as repair shops, labs, and offices. Such activities involve the use of heavy earthmoving equipment and explosives for mining and material handling, exploration equipment for refinement of the ore reserve base, hazardous or dangerous reagents for processing requirements, and general construction activities.

The size of mines varies greatly and not all mines would require all the previously mentioned facilities and equipment. Acreage involved can range from several acres to several hundred acres.

## Reasonable Foreseeable Development Scenarios

Based on the last planning period record of mineral and exploration and development levels, it is expected that 400 Notices and 15 Plans of Operation would be submitted under all alternatives including the No Action Alternative over the life of this plan. A variety of mining operations are foreseen to occur including: in-stream suction dredging, placer exploration, bench placer mine, underground (Lode), and open pit (Lode).

Most mining and exploration would occur in the Klamath geologic province.

## In-Stream Suction Dredging

In-stream dredging is usually a one- or two-person operation using a floating suction dredge with a five to seven horse power engine. The dredge mines the gravel down to bedrock. The gravels are passed over a sluice box and return to the stream without the gold. This process does not require any chemicals. Most of the dredges have an intake nozzle opening of less than five inches in diameter. The average stream area disturbed in any year is less than 1,000 square feet per dredge operation. Other activities associated with dredging include temporary occupancy and minor road and trail construction. It is predicted that at least three-fourths of the Notices expected to be filed during the plan period would pertain to in-stream suction dredging, therefore, it is predicted that 300 Notices would be filed for this type of mining activity.

## Placer Exploration

Many of the in-stream suction dredge operations described previously could be classified as exploration activities, however, it was decided to break them out separately. Placer exploration consists of test pit digging either by hand or with a backhoe or hydraulic excavator. It is predicted that 60 Notices would be received during the plan period for placer exploration. A typical Notice would describe minor road construction necessary for accessing three test pit locations. The size of each test pit is predicted to be about 15 feet-by-5 feet and 10 to 15 feet deep. If low mineral values are discovered, then the pits would be backfilled and the area seeded and fertilized. If significant mineral values are discovered, then the Notice level operation is predicted to develop into a Plan level of operation as described under the Bench Placer operation described below.

## Bench Placer

Bench placer operations vary in size from one person to six persons operating excavators, backhoes, loader, larger dozers, trommels, vibratory wash plants, draglines, and sluice boxes. Other associated equipment includes water pumps, generators, and conveyors. These operations vary in scope, processing between 10 to 500 loose cubic yards of gravel per day. The average operation of this type processes 50 yards per day, operating 90 days per year.

The mining process could be generalized as follows: vegetation and overburden clearing, excavation of

bench gravels, haul to processing plant, washing gravel in plant with water, concentration of heavy metal in sluice box, and tailing placement back into the excavated area as part of the reclamation plan.

The finer material that washes over the sluice box is allowed to settle out in settling ponds to prevent siltation of adjacent streams. The water in the pond can be recycled through the wash plant to conserve water, and after the tailings are contoured for reclamation, the soil can be spread over the gravels and reseeded. Annual new surface disturbance for each of these operations averages two acres. Other associated activities include occupancy, road construction for access and ore haul route, construction of settling ponds approximately 200'-by-60'-by-15' deep, water diversion for a wash plant, and in extreme cases the streams may be diverted into alternate channels so that the stream channel can be mined following issuance of the necessary state permits. It is forecasted that 50 bench placer operations would occur over the duration of the plan, disturbing approximately 200 acres.

## Loose Exploration

It is anticipated that 100 Notices would be filed during the plan period pertaining to vein loose exploration and possible development. Exploratory work including drilling, blasting, and bulk sampling would be the emphasis of these projected notice-level operations. Some road and trail construction is anticipated for the operator to access the test sites for sample collection. Surface disturbance for each operation is not expected to exceed four or five acres. These operations would be monitored according to the policies shown in Appendix 2-EM-2, Draft RMP. Should the results of exploratory testing delineate a minable deposit and the proposed cumulative site disturbance exceeds the five acre threshold, a plan of operations would be required pursuant to the regulations previously cited.

For a disseminated gold exploration project, it is predicted that during the preliminary exploration phase, approximately ten holes would be drilled utilizing truck mounted drill rigs. Drill sites would disturb less than a tenth of an acre. Temporary access roads, 10-12 feet wide, would be constructed for about one-third of the drill holes, but in most cases the existing roads would be utilized. In the second phase of exploration, it is predicted that the operator would conduct drilling and sampling on a defined grid in order to better evaluate the amount of ore reserves within the project area. Additional equipment access roads would be necessary to

complete this exploratory drilling, and it is anticipated that the projected total site disturbance would be between 5 to 10 acres and monitored under and approved Plan of Operations filed pursuant to 43 CFR 3809.1-4 and the policies shown in Appendix 2-EM-2, Draft RMP. If the prospect is developed into an operating mine, the operation is expected to encompass approximately 15 acres and would be monitored under a revised approved Plan of Operations. Reclamation of the mine site would be conducted at the conclusion of, and possibly concurrent with, operations.

## Underground Mining

Underground mining is the most costly form of mining. Historically underground mining in this district has been primarily for gold along vein structures varying in width from a few inches to four feet. This mining method creates the least amount of surface disturbance because all ore is underground and eventually mine wastes are returned underground to promote structural integrity. Operations associated with underground mining include vertical to inclined shafts open to the surface and near horizontal adits for drainage and or extraction. Tram roads may be required to get the ore to the mill. The ore would be milled using rock crushers, ball mill, rod mills, flotation cell gravity separation or chemical leaching using cyanide. The mill may require five acres of both hillside and flat ground, tailing disposal ponds, bunk houses, sanitary facilities, and electrical rights-of-way. Timber from the claim(s) may be required for support timbers, rail ties, and various buildings.

## Open Pit Chemical Leaching

Development of efficient heap leach extraction processes in the last 10 years has made possible the exploration of many near surface, low grade precious metal deposits requiring less capital. The scale of operation might vary between ore reserves as low as 150,000 tons to as much as 100 million tons. The size of development can therefore vary from 20 acres to 4,000 acres. A small operation would probably employ 15 operators with five supervisors, and the operation could be completed within three years including reclamation. The larger operation could employ 200 and the life of the mine may be 20 years. A variety of leaching processes are used in the industry depending on the chemistry of the ore, climatic and geographic limitations, and the scale of the operation. Open pit heap leaching is more favorable in warm/dry climates and with low ore grades where high production rates are required.

Smaller scale operations and wetter climates may require covered or sealed vats, which call for more capital and time, therefore higher grade ore. With this new development in technology, many areas in the west are being explored for low grade disseminated gold in epithermal altered volcanics and silicified sedimentary and volcanic rocks. Grassy Mountain, in Malheur County, is the first proposed operation using this technology in Oregon. It is estimated that gold production at this site could be as much as 100,000 ounces per year with an additional 100,000 ounces of silver for a period of nine years. The annual value of production is estimated to reach \$82 million per year. The total surface disturbance for the operation is expected to be about 900 acres.

Heap leaching requires stripping overburden overlying the minable ore and stockpiling the overburden. The ore is usually blasted prior to being excavated and then hauled to a primary crushing plant. Crushed rock is then placed on a sealed leach pad where dilute sodium cyanide is sprinkled or pumped into the ore, saturating it in a pond. The cyanide solution dissolves the gold (70 percent) into solution, and this gold bearing solution is then pumped from the base of the pad or the sealed vat to columns of crushed activated carbon where it is absorbed by the carbon. Once the gold is removed, the cyanide solution is recharged and recycled through the heap or vat. A typical leaching period is 60 to 90 days. Leach pads vary in size from a thousand ton capacity to several hundred thousand tons. The stripped rock is not removed from pad. New ore is placed over the previously leached rock and the process starts over. Cyanide and HCN gas is toxic to humans, animals, and vegetation but although there is grave concern for the effect of cyanide on humans, there have been few reported accidents to humans working with cyanide in the mining industry. The effect of low level exposure to cyanide are documented in a study by OSHA, 1976.

Other support service required for leaching operations include: electrical power, water (500 gallons per minute), access roads for large oversize equipment, fuel and chemical storage, sanitary and waste disposal, fencing, and community services and housing.

For the planning area, it is forecasted that one plan of operation would be submitted for a small leaching operation in the next ten years. This operation would probably disturb 25 acres and last three years, including the reclamation phase. Approximately 160,000 tons of ore would be mined and 180,000 tons of overburden would be stripped and stockpiled. The excavation area would be about 13 acres and



probably would not be backfilled. Overburden would be contoured covering about four acres. The remaining seven acres would be for support buildings, chemical fuel storage, leach pad, ponds, and roads. The mine would only operate during the summer and fall months because of the wet and freezing climate at other times of the year. Upon completion of the mining operation, all roads would be scarified, improvements removed, ponds and leach pads neutralized to meet Oregon Department of Environmental Quality standards, and overburden spread over the ponds and pads, and seeded to meet Oregon Department of Geology and Mineral Industry standards for reclamation. Total gold produced from this operation is estimated to be 24,000 ounces, worth nearly \$10 million. It is forecasted that this operation would occur for all alternatives.

## **Saleable Mineral Resources**

### **Future Trends and Assumptions**

It is anticipated that the public would continue to request the purchase or free use of mineral materials from quarry sites located on the district. When possible, the use of existing sources is preferred, however new site development is not precluded in this plan.

The quality and quantity of the mineral materials available at a given site are important factors in the decision of whether or not a source is used by either the public or government agencies. The site location and distance to the point of use is another important consideration.

### **Projected Quarry Development Scenario Common to All Alternatives**

It is expected that ten new quarry sites would be developed in the operating area during the plan

period. On the average, each site is expected to disturb approximately two acres of land. This acreage would be developed for use as a rock crushing operating area, truck turn around, access trails for bulldozers and drills, overburden stockpile sites, and aggregate stockpile area. For access to a new quarry site, approximately one-half acre of land would be disturbed by new road construction, most often affiliated with a timber sale contract.

It is expected that 75 to 85 existing quarry sites on the district would be utilized and possibly expanded during the plan period. Probably no more than half of these sites would be expanded over the course of the plan period, and these expansions most likely would be less than one acre. In some cases, new vehicle access must be constructed to allow for such expansion and when this is the case, roughly one-tenth of an acre per site would be involved.

It is expected that five to ten of the existing quarry sites would be depleted in the operating area during the plan period. After all usable rock is removed, reclamation work would be conducted according to an approved interdisciplinary reclamation plan.

### **Projected Decorative Stone Site Development Scenario Common to All Alternatives**

It is expected that the district office would receive five or six sale requests per year for decorative stone. In most cases, existing roads would provide access to the material sites. There is a possibility that temporary road or trail construction may be necessary, effecting about one-fourth acre.

Where the decorative stone is judged to be the highest and best use of the material, an appraisal of the fair market value would be necessary, otherwise, if the use is construction material, the blanket appraisal used for disposal out of material sites on the district would be utilized to establish the purchase price of the material.

# Appendix Y

## Consistency

This appendix contains three tables that document consistency requirements of the RMP with other federal agencies, state and local governments, and Indian tribes. Table Y-1 is "Consistency of the

Proposed RMP with the Forestry Program for Oregon (FPFO)." Table Y-2 is "Consistency of the Proposed RMP with State of Oregon Wildlife Plans." Table Y-3 is "Relationship of Proposed RMP to Statewide Planning Goals."

**Table Y-1. Consistency of the Proposed RMP with the Forestry Program for Oregon (FPFO)**

Forestry Program for Oregon Objective	Consistency of the Proposed RMP
<p><b>Forest Land Use.</b> Preserve the forest land base of Oregon: Stabilize the present commercial forest land base. Manage habitat based on sound research data and the recognition that forests are dynamic and most forest uses are compatible over time.</p>	<p>Preserves most of the forest land administered by BLM, while allowing for some conversion of forest to accommodate expansion of transportation, power and communication facilities. Also allows for exchange and/or sale of some forestlands, which could lead to their conversion to nonforest uses if local land-use plans permit. Land that would be managed for commercial forest products totals 190,000 acres, less than the 444,400 acres currently allocated to commercial forest production. The allocation of additional land to uses other than timber production is based on current research data.</p>
<p><b>Forest Practices.</b> Assure practical forest practices that conserve and protect soil productivity and air and water quality; Promote forest practices that maintain Oregon's forest values, including forest tree species, fish and wildlife, soil productivity, and air and water quality. The Forest Practices Act and rules are one vehicle for accomplishing this.</p>	<p>Provides for the use of practical forest practices that meet this goal and meet or exceed the requirements of the Oregon Forest Practices Act and rules of the Oregon Smoke Management Plan, with two possible exceptions:</p> <p>(1) possible inconsistency with the clear cut size and proximity requirement of Section 4 of the Forest Practices Act as revised in 1991. Recent interpretations of that requirement indicate that, for its purposes, "clear cuts" include most shelterwood harvest units so they would also include harvest units with retention of 6 to 8 green trees per acre and even with 16 to 25 green trees per acre. Although BLM harvest units will be fragmented by Riparian Reserves, the 300-foot distance (from adjacent units) requirement in the Act would not cover all units on both sides of intermittent streams; thus, the 120-acre limit might be violated, though the Proposed</p>

**Table Y-1. Consistency of the Proposed RMP with the Forestry Program for Oregon (FPFO) (continued)**

Forestry Program for Oregon Objective	Consistency of the Proposed RMP
Timber Growth and Harvest. Promote the maximum level of sustainable timber growth and harvest on all forestlands available for timber production, consistent with applicable laws and regulations and taking into consideration landowner objectives.	<p>Plan seems consistent with the Forest Practices Act objective.</p> <p>(2) The requirement for smoke management clearance prior to burning slash and need for completion of burning before replanting, may cause delay in reforestation beyond the one year required by the Act. Also, it may be impossible to comply with objectives for ecosystem management and still meet the requirements of the Oregon Smoke Management Plan.</p> <p>Provides for the use of intensive forest management practices that are professionally and environmentally sound, to promote timber growth and harvest on all forest lands allocated as available for such intensive management, consistent with the Plan's goals and objectives.</p>
Recreation, Fish and Wildlife, Grazing and Other Forest Uses. Encourage appropriate opportunities for other forest uses, such as fish and wildlife habitat, grazing, recreation and scenic values on all forest lands, consistent with landowner objectives: A full range of recreation opportunities is encouraged. Where needed to reduce harassment and/or over harvest of wildlife, road closure programs are supported.	Provides opportunities for other forest uses, consistent with the plan's goals and objectives. Road closures to protect wildlife habitat and other values are emphasized.
Forest Protection. Devise and use environmentally sound and economically efficient strategies to protect Oregon's wildfire, insects, disease and other damaging agents: Use integrated pest management. Minimize total cost plus loss resulting from wildfire. Employ cost-effective fire management policies that emphasize planned ignition fires over natural ignition fires and that consider impacts to the state's forest fire protection plan.	Economically efficient protection strategies would be employed, and integrated pest management would be used. Minimizing forests from total cost plus loss from wildfire would be integral. Planned-ignition prescribed fires would be emphasized over natural-ignition prescribed fires, but the latter could be used to achieve resource and fire management objectives. Cooperation with other fire suppression agencies, including state and local agencies, would help assure cost-effective fire protection and suppression by all parties. Additional emphasis is also placed upon restoring forest health.



Table Y-2. Consistency of the Proposed RMP with State of Oregon Wildlife Plans

State Plan/Statute	Objective	Consistency of Proposed RMP
Oregon Statutory Wildlife Policy, Revised Statute 496.012	Maintain all species of wildlife at optimum levels and prevent the serious depletions of any indigenous species.	May maintain some populations at less than optimum (see later discussion of big game management objectives and Effects on Wildlife.)
	Develop and manage the lands and waters of the State in a manner that will enhance the production and public enjoyment of wildlife.	
	Develop and maintain public access to the lands and waters of the State and the wildlife resources thereon.	Public access would be limited by access management.
	Regulate wildlife populations and public enjoyment of wildlife in a manner that is compatible with primary uses of the lands and waters of the State and provide optimum public recreational benefits.	
Oregon Threatened and Endangered Species Act	Protect and conserve wildlife species that are determined to be threatened or endangered.	All State listed species found within the Medford District are also Federally listed under the Endangered Species Act. As such, these species will be protected under the requirements and provisions of the Act.
Oregon's Sensitive Species Rule	Help prevent species from qualifying for listing as threatened or endangered.	Species on Oregon's sensitive species list would be protected well. Also see later discussions of wild fish policy and fish plans.
Nongame Wildlife Plan	Maintain populations of naturally occurring Oregon nongame wildlife at self sustaining levels within natural geographic ranges in a manner that provides for optimum recreational, scientific and cultural benefits and, where possible, is consistent with primary uses of lands and waters of the State.	See preceding discussions.

Table Y-2. Consistency of the Proposed RMP with State of Oregon Wildlife Plans (continued)

State Plan/Statute	Objective	Consistency of Proposed RMP
Big Game Population Management Objectives	Develop, restore and/or maintain big game (along with aesthetic and commercial opportunities and benefits) at the level identified in 1980 as the planning target level by game management unit. This is accomplished through hunting season regulation and management practices on public lands that tend to stabilize the cover-forage relationship in space and time, provide for a wildlife emphasis in management of sensitive wintering areas, and offer habitat improvement opportunities.	Forage on BLM-administered lands would decline. Private lands, however, associated recreation, are expected to provide adequate forage. Access management would improve habit for elk.
Wild Fish Policy	Protect and enhance wild stocks.	Would not change habitat conditions enough in the short-term to alter existing stocks. In the long-term, would protect streams sufficiently to protect wild stocks and provide sufficient stream habitat protection to contribute to their enhancement.
Coho, Steelhead and Trout Plans	Maintain and enhance production.	Similar to wild stocks. See preceding.
Basin Fish Management Plans	Establish compatible objectives for management of all fish stocks in each Basin.	Similar to wild stocks. See preceding.
Oregon Forest Practices Act Rules	Establish minimum standards which encourage and enhance the growing and harvesting of trees while considering and protecting other environmental resources such as air, water, soil and wildlife.	See Item 2, Table Y-1 in this Appendix.

Table Y-3. Relationship of Proposed RMP to Statewide Planning Goals

Statewide Goal Number and Description	Consistency of Proposed RMP
<p>Citizen Involvement. To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process. Federal and other agencies shall coordinate their planning efforts with the affected government bodies and make use of existing local citizen involvement programs established by cities and counties.</p>	<p>BLM's land use planning process provides for public input at various stages. Public input was specifically requested in developing issues, planning criteria, and the Proposed RMP. Coordination with affected government bodies, including the Governor's forest planning team, has been ongoing and will continue. BLM has used County planning departments to provide linkage to local citizen involvement programs.</p>
<p>Land Use Planning. To establish a land use process and policy framework as a basis for all decisions related to use of land and to assure an adequate factual base for such decisions and actions.</p>	<p>The proposed RMP has been developed in accordance with the land use planning process authorized by the Federal Land Policy and Management Act of 1976, which provides a policy framework for all decisions and actions. The process includes issue identification, inventories and evaluation of alternative choices of action. Intergovernmental coordination in the planning process is discussed in Chapter 5 of the RMP/EIS.</p>
<p>Agricultural Lands. To preserve and maintain existing commercial agricultural lands for farm use, consistent with existing and future needs for agricultural products, forest and open space.</p>	<p>The Proposed RMP does not exclude BLM-administered grazing land from grazing use or affect the use of other lands for agriculture use.</p>
<p>Forest Lands. To conserve forestlands for forest uses. Growing and harvesting of forest tree species is the leading use on forestland consistent with the sound management of soil, air, water, and fish and wildlife resources and provision for recreational opportunities and agriculture.</p>	<p>BLM-administered lands in the planning area are predominately forestland and woodlands. The Proposed RMP would not lead to substantial conversion of those lands to nonforest uses. Conversion areas such as new forest roads and utility rights-of-way would be limited to the minimum width necessary for management and safety, and the latter limited to existing corridors where practical. The proposed RMP is consistent with the State's forestland protection policies, with one possible exception (See item 5, Table Y-1 in this Appendix.)</p>
<p>Open Spaces, Scenic and Historic Areas, and Natural Resources. To conserve open space and protect natural and scenic resources.</p>	<p>Natural, historic and visual resources were considered in the development of the Proposed RMP. Availability of mineral, aggregate and energy sources would continue, but be somewhat limited. Timber and ecosystem management actions would impact natural and visual resources.</p>

Table Y-3. Relationship of Proposed RMP to Statewide Planning Goals (continued)

Statewide Goal Number and Description	Consistency of Proposed RMP
<p>Programs shall be provided that will (1) insure open space, (2) protect scenic and historic areas and natural resources for future generations, and (3) promote healthy and visually attractive environments in harmony with the natural landscape character. The location, quality and quantity of the following resources shall be inventoried:</p>	<p>Adverse impacts to visual resources, wildlife habitat, potential wild and scenic rivers and State waterways, and unique natural areas would be slight. Water areas, wetlands and watersheds would be protected. See Chapter 4 for discussions. Also see item 2 of Table Y-1 for discussion of consistency with relevant sections of the Forest Practices Act and Rules.</p>
<ul style="list-style-type: none"> <li>a. Land needed or desirable for open space;</li> <li>b. Mineral and aggregate resources;</li> <li>c. Energy sources;</li> <li>d. Fish and wildlife areas and habitats;</li> <li>e. Ecologically and scientifically significant natural areas, including desert areas;</li> <li>f. Outstanding scenic views and sites;</li> <li>g. Water areas, wetlands, watersheds and groundwater resources;</li> <li>h. Wilderness areas;</li> <li>i. Historic areas, sites, structures and objects;</li> <li>j. Cultural areas;</li> <li>k. Potential and approved Oregon recreation trails;</li> <li>l. Potential and approved Federal wild and scenic waterways and state scenic waterways.</li> </ul>	<p>The Proposed RMP attempts to balance conflicting uses in light of their consequences. Conflicting resource uses are most often resolved by protecting the Goal 5 resource site or severely limiting conflicting uses to meet environmental goals.</p>
<p>Where no conflicting uses for such resources have been identified, such resources shall be managed so as to preserve their original character. Where conflicting uses have been identified, the economic, social, environmental and energy consequences of the conflicting uses shall be determined and programs developed to achieve the goal. Based on the analyses of economic, social, environmental and energy consequences of the conflicting uses shall be determined and programs developed to achieve the goal. Based on the analyses of economic, social, environmental and energy consequences to Goal 5 resources listed above, conflicting uses of (BLM managed) lands and resources may be resolved by selection of three management options: (1) protect the resource site, (2) allow conflicting uses fully, or (3) limit conflicting uses. This is achieved by designating with certainty what uses and activities are allowed fully, what uses and activities are not allowed at all, and which uses are allowed conditionally, and what specific standards or limitations are placed on the permitted and conditional uses and activities for each resource site.</p>	<p>Even without any tradeoffs to enhance or maintain the existing commercial forest program, tradeoffs would be necessary between Goal 5 resource values. For example, mineral and aggregate resource or energy source access and development frequently conflict with all other Goal 5 values, and strict guidelines for the management of designated or potential wilderness or Federal wild rivers may virtually preclude development or active management to benefit other Goal 5 resource values.</p>

Table Y-3. Relationship of Proposed RMP to Statewide Planning Goals (continued)

Statewide Goal Number and Description	Consistency of Proposed RMP
<p>Air, Water and Land Resources Quality. To maintain and improve the quality of the air, water and land resources of the State.</p>	<p>The Federal and State water quality standards would be met and water quality would be maintained and/or improved. See Effects on Water Resources, for discussion. Burning would have a potential effect on air quality, but without prescribed fire, the effects of wildfires on air quality would increase. The Proposed RMP would comply with the Oregon Smoke Management Plan and the State Implementation Plan. See Effects on Air Quality, for discussion. Also see item 2 of Table Y-1 for discussion of consistency with relevant sections of the Forest Practices Act and Rules.</p>
<p>Areas Subject to Natural Disasters and Hazards. To protect life and property from natural disasters and hazards.</p>	<p>Natural hazard areas, particularly flood plains and areas with highly erosive soils have been identified. The Proposed RMP provides for appropriate management of natural hazard areas. BLM authorized developments within natural hazard areas would be minimal, with project construction engineering reflecting site-specific conditions and requirements.</p>
<p>Recreational Needs. To satisfy the recreational needs of the citizens of the State and visitors and, where appropriate, to provide for the setting of necessary recreational facilities including destination resorts. Federal agency recreation plans shall be coordinated with local and regional recreational needs and plans.</p>	<p>The BLM actively coordinates its recreations and land use planning efforts with those of other agencies to establish integrated management objectives on a regional basis. Opportunities would be provided to meet recreation demand (identified in Oregon's SCORP). Projected demand for activities on BLM-administered land would be met, except that the Proposed RMP would not meet demand for off-highway vehicle use. See Effects on Recreation, for further discussion.</p>
<p>Economy of the State. To diversify and improve the economy of the State.</p>	<p>The Proposed RMP would support reduced levels of BLM resource dependent employment and payments to counties, due to diminished timber production. Employment in rural areas would be most affected. See Effects on Socioeconomic Conditions, for further discussion.</p>

Table Y-3. Relationship of Proposed RMP to Statewide Planning Goals (continued)

Statewide Goal Number and Description	Consistency of Proposed RMP
Public Facilities and Services. To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.	BLM-administered lands may be made available for development of public facilities or services by other parties, if the action would be permitted under the local government comprehensive plan and land use regulations, and relevant State setting requirements.
Transportation. To provide and encourage a safe, convenient and economical transportation system.	The Proposed RMP provides for accommodation of identified transportation needs, particularly for transportation of timber where not in conflict with Endangered Species Act requirements, but setting a major new transportation route (e.g., State highway) would require a plan amendment. Major utility corridors were considered and would be designated. The Proposed RMP supports State policy objectives to restrict use of BLM roads for access to nonresource development that would be inconsistent with State planning goals.
Energy Conservation. To conserve energy.	Conservation and efficient use of energy sources are objectives in all BLM activities. Although the Proposed RMP finds some additional rivers suitable for inclusion in the National Wild and Scenic River System, which would restrict the possibility of development of their hydroelectric potential, there are no pending development proposals and those rivers are considered to have low potential for hydroelectric use. Firewood sales would be permitted but firewood availability would be limited by allocation of substantial acreage to limited or no timber harvest.

FOOTNOTE: Statewide goals 10 (Housing), 14 (Urbanization), and Ocean Resources (20) are not considered applicable.

## Appendix Z

# Effects of Silvicultural Systems on Tree-Form Species Composition

The following table is a result of ORGANON simulation. Species composition is shown by basal area rather than by numbers of individuals since basal area is the stand characteristics which best combines species numbers, tree size, and species dominance.

**Table Z-1. Species Composition of Forest Stands Managed for Timber Production by Alternative (Last decade of rotation)**

Tree Species	Current Condition <sup>1</sup>	Percent Composition by Basal Area		Proposed Alternative North	Proposed Alternative South
		Alternatives NA, A, B, D, E	Alternative C Low Retention		
Jackson SYU					
Douglas-fir	71	95	74	95	70
Pine species	8	2	2	2	6
White-fir	12	1	16	1	19
Other conifers	3	1	2	1	4
Hardwoods	7	1	6	1	3
Josephine SYU					
Douglas-fir	70	94	79	93	82
Pine species	7	3	6	4	7
White-fir	4	1	4	1	5
Other conifers	3	1	5	1	6
Hardwoods	16	1	6	1	6
Klamath SYU					
Douglas-fir	22	13	19		15
Pine species	15	78	7		4
White-fir	57	8	70		79
Other conifers	1	1	1		1
Hardwoods	5	0	3		1

<sup>1</sup>Current condition for mature and old growth stands without harvest entry.

With the exception of pine plantations, shifts in tree species mixes are fairly minor between silvicultural regimes. The principal change is a reduction in hardwood composition and an increase in percent composition by the principal commercial species in each SYU (Douglas-fir or white fir).





# Appendix AA

## Effects of Change in the Potential Suitable Commercial Forestland Base on Reforestation Potential

The suitability inventory timber production capability classification (TPCC) completed in 1988 resulted in a net increase in the number of suitable commercial forest acres available for allocation of 109,019 acres. The total suitable inventory is not allocated to timber production under any alternative, but it results in a larger number of acres being available for timber production under Alternatives A and B than would be available under the No Action Alternative. Because of controversy surrounding the reforestation potential of land in southwestern Oregon, the Medford District Manager, in November 1988, commissioned a technical review of that inventory. The review resulted in the overall finding that the inventory was credible and accurate.

Following the review, other analyses of research and operational monitoring results were conducted to determine if reforestation success would be expected to change as a result of the change in allocation base. Reforestation success on BLM operational LIM units was roughly comparable to reforestation success on lands inventoried as HLM, and were highest for the southern GFMA of the district. Visits to sites with poorer results indicated that prescription deficiencies or operational problems were the probable cause of reforestation problems.

Research conducted under the Forestry Intensified Research Program (FIR) of Oregon State University explored the factors associated with reforestation success in southwestern Oregon. The study "Regeneration Potential of Withdrawn BLM Lands in the Medford District" was specifically designed to examine the role that site characteristics would play in determining reforestation success. If the study showed a statistically significant relationship between reforestation success between sites, then it would be possible to support estimates of different levels of reforestation success on those different sites.

The study examined reforestation results on 39 sites that were classified on two gradients (dry-season solar radiation load and available soil water) which were thought to best represent the reforestation potential of sites. These sites were planted with both

pine and Douglas-fir seedlings of a variety of different stock-types by BLM contract tree planters, then maintained with routinely available vegetation management and protection practices. No extraordinary practices were used. Douglas-fir survival was used as the primary indicator of reforestation success. Growth data was also recorded. Extensive soil data was collected.

After five years, survival of the Douglas-fir stock-types was 72 percent for 1-0 plugs and 73 percent for the 2-0 bare-root seedlings. Survival of ponderosa pine averaged approximately 10 percent higher. The study found that few relationships existed between site characteristics and reforestation success, particularly for Douglas-fir. The success of reforestation with ponderosa pine was somewhat greater at lower elevations and for soils with larger amounts of coarse fragments.

The study documents that physical environment does not limit reforestation success across a broad range of sites if reforestation practices are properly prescribed and carried out. Study results differed from previous studies of reforestation potential conducted in the area which showed significant relationships between stocking with conifers and environmental variables (Stein 1981; Stein 1986; Graham et al. 1982; Minore et al. 1982). The FIR research team concluded that the differences probably were caused by differences in treatment. When reforestation treatments are correctly developed and when attention is paid to seedling quality, planting quality, and vegetation control; site factors explain less variation in reforestation success. When reforestation cannot be adequately prescribed and controlled, site variables are strongly related to reforestation success (Tesch, personal communication). Comments received from some members of the 1990 Reforestation Technical Review Group (USDI 1991) indicated that Medford District was at its limit of being able to keep up with its reforestation program. Greater difficulty would be experienced in maintaining a program of the quality necessary to reforest difficult sites at the reforestation workload levels in Alternatives A and B than in the other alternatives.

While research and operational results indicate that very adequate levels of reforestation success can be achieved across the suitable forestland base, it must be recognized that these results require the funding and proper application of available technology. No single piece of technology such as herbicides appears to be necessary for reforestation of specific tracts or categories of land, but under conventional even-aged management systems, restrictions on the use of appropriate technology make achievement of reforestation success more expensive and less predictable on poorer sites than on better sites.

Incorporation of ecosystem based processes within changed or modified silvicultural systems will likely show improved reforestation success over conventional even-aged systems on both suitable commercial forestland and suitable commercial woodlands. The design of the silvicultural system prescribed for the southern GFMA includes features that should improve reforestation success on lands that would otherwise be more difficult to reforest using conventional approaches and techniques.

## Declines of Stocking Over Time

Stand density and stocking levels in plantations tend to decline over time as seedling mortality occurs. Research has shown that the most significant mortality occurs within the first two to three years of a stand's life, and that mortality decreases significantly in the following years but continues over the life of stands. Hann and Wang (1990) developed mortality equations for southwestern Oregon based in part 24 research installations in southwestern Oregon. Figure 4-T-1 illustrates the probability of noncompetition based mortality of individual trees in stands. Research plot data, in stands with relative density indices below 0.6, indicates that mortality rates of 1 to 1.5 percent per year can be expected in southwestern Oregon plantations, even after establishment.

The best data set that describes stocking fall-down over time for southwestern Oregon is the FIR reforestation potential study. This data is directly applicable to BLM-administered land so long as operational units receive necessary levels of vegetation management and protection from animal damage. Figure 4-T-2 summarizes the combined trend of stocking fall-down by species and stock type on the 39 regeneration potential study sites.

On the 39 sites, survival of Douglas-fir has fallen to a lower level than has pine. The rate of declines for both species has leveled off to the general rate predicted by Hann and Wang (1990) for young stands and can be expected to decline at that rate.

Mortality, usually in patches, has been observed in some older Douglas-fir plantations in the last two years, particularly in the Applegate. Evaluation of these areas indicates that mortality is associated with: (a) limited areas of shallow rocky soil which did not contain merchantable trees in the previous stand or which contained a few scattered large pine or oak, or (b) areas that are pine or white oak sites but were planted with an inappropriate species. Areas of white oak series mistakenly classified as capable of commercial conifer production in the TPCC have been removed from the suitable category.

## Reforestation of Frost Hazard Areas

Analysis of management alternatives for the BLM mixed conifer forests of the southern Cascades began in 1988 with a field trip for the Medford and Lakeview managers, and with further review in 1990 by a Technical Working Group convened at the request of the Medford District Manager to review the results of reforestation actions on Medford BLM District during the decade of the 1980s. Both reviews indicated the need to restrict regeneration cutting on most sites to avoid reforestation failure associated with growing season frost, grass competition, and animal damage on the Dead Indian plateau and the Butte Falls-Prospect Flat.

Seidel and Cochran (1981) noted that a residual overstory of 60 to 80 square feet of basal area per acre is sufficient for obtaining adequate natural regeneration in the mixed conifer forests of the eastern Oregon Cascades. On the worst frost-prone sites on the Medford District, experience indicated these levels of basal area retention were not adequate to provide protection from frost or to significantly reduce grass competition. Don Minore and others conducted research on the Dead Indian plateau (Minore 1978) (Williamson and Minore 1978) which resulted in the recommendation to leave 60 percent canopy as measured by spherical densitometer as the optimal level to obtain natural regeneration. Since overstory trees compete with regeneration and reduce growth and since higher overstory densities cause problems in overstory removal, it is desirable to leave no more overstory

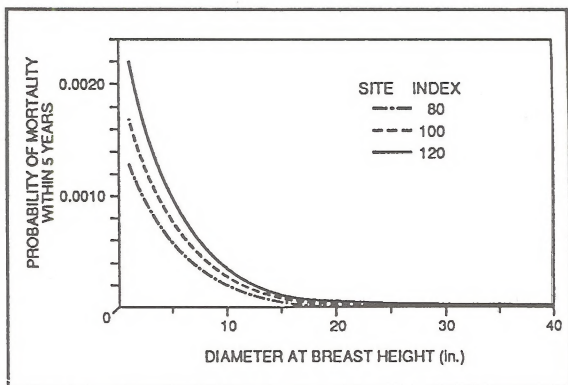


Figure 4-T-1. Predicted probability of mortality within 5 years for Douglas-fir trees with crown ratio (CR) = 1 and basal area of larger trees (BAL) = 0, when site index (SI) is 80, 100 or 120.

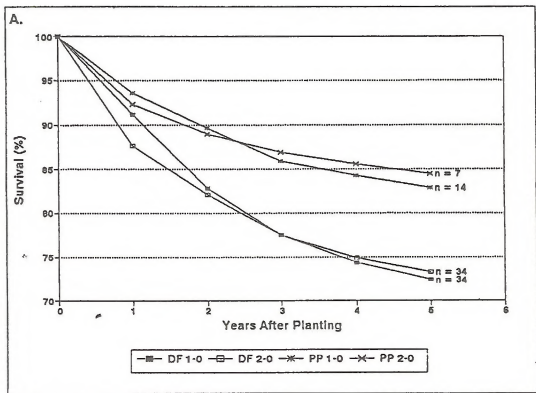


Figure 4-T-2. Survival over time by species and stock type.

## Appendix AA

than is needed for prevention of excessive frost damage.

The trade-off between frost damage and growth reduction is particularly significant because overstories must be left on for long periods of time. Established seedlings as much as four or five feet in height can be killed by frost if overstories are removed too early.

BLM partial cuts on the Dead Indian that constrained planted Douglas-fir seedlings taller than breast height and which were in severe frost hazard areas were used in an analysis that compared seedling survival and growth with the level of canopy retention. Data indicated there was a strong negative correlation between retained basal area and seedling height, seedling diameter, and current height growth, with the greatest size and growth occurring with retained overstories of approximately 120 square feet of basal area. Satisfactory growth was obtained with basal areas as high as 160 square feet. Mortality and growth reduction from frost became significant with retention of 100 square feet or less basal area.

In actual timber sale planning, higher levels of basal area will be needed on some sites with very severe frost problems or with high potentials for blowdown. Lower levels could be left on slopes, on the lower elevation Butte Falls-Prospect flat, or other locations with lower risks.

## Effects of Ecosystem-Based Strategies

Limited experimental data exists which deals with the speed and manner in which natural regeneration occurs in forests. Clearcutting was the usual harvesting method in the region and clearcuts are usually slow to regenerate naturally. While it was known that shelterwood regimes would often contain natural regeneration (Herman 1978), opinion held that partial cut stands would be lost to competing vegetation rather than resulting in conifer establishment.

William Stein (1981, 1986) surveyed regeneration in BLM units in southwestern Oregon. He found that most partial cuts were moderately or well stocked with natural regeneration. Williamson (1973) and Seidel (1983) assessed natural regeneration in Forest Service partial cuts in the Cascades. Both

found that partial cutting resulted in generally satisfactory natural regeneration, with regeneration success being related to adequate exposure of mineral soil and sufficient retention of overstory density.

BLM examined natural regeneration in partial cuts under the "Slow Crow" LIM study in the Butte Falls Resource Area and also monitored natural regeneration in sites affected by the 1987 fires (Lewis, Park and Tuttle 1991). In each case examined, prompt natural regeneration occurred on units where combination of retained overstories and disturbance existed. With less disturbance, regeneration was slower and Douglas-fir regeneration was poorer with light canopies or in larger openings in stands.

These results support, but are not adequate to prove, that high levels of relatively prompt natural regeneration would be obtained after the experimental harvests of woodlands proposed in Alternatives A and B, after harvest with the silvicultural systems proposed for Alternative C, and the south regime for PRMP. Adaptive research would be necessary to select the best sequences of treatment, level of overstory retention, and other features of the silvicultural regimes proposed for these alternatives.

## Prompt Reforestation

BLM manuals and procedures require prompt reforestation of harvest units and set a goal of completing regeneration within five years of completion of yarding and site preparation. Analysis of BLM stocking surveys recorded in MicroStorms (see Chapter 3) indicated that 2,055 acres of units which had been yarded five or more years ago were shown as understocked or pending reforestation treatments. An analysis of these units was conducted to determine whether a particular strata of land could be identified which had proved incapable of meeting BLM stocking standards.

BLM manuals require that units not be classified as stocked at minimum until the time of establishment survey. For that reason, 1,241 acres or 60 percent of the total number of acres shown in these categories are stocked to minimum standards or higher, but were shown as understocked or pending treatment in Chapter 3.

Units which are actually understocked (1992) are located as follows:

<u>Resource Area</u>	<u>Acres Understocked</u>
Ashland	205
Butte Falls	99
Glendale	170
Grants Pass	318
Total	792

Of the 792 acres, 608 acres were planted in 1992 but have not yet received a resurvey to evaluate success.

An evaluation of these units indicated that reforestation failure was most likely associated with ineffective, missing, or poorly timed vegetation control on 502 acres; frost damage on 136 acres; and animal damage on 154 acres. All of the units were felt to be reforestable and are included in the suitable lands available for allocation. In TRIM PSQ analysis, nonstocked lands are carried as nonstocked for the next decade.

## **Spatial Variation in BLM Reforestation Units**

Reforestation units do not have perfectly regular spacing. Openings that are not stocked with conifers exist in stands because of variation in physical site characteristics, tree disease pockets, or reforestation failure in specific spots. The fate of these openings varies depending on their size, characteristics of the plant community, and physical site characteristics. Over time, these openings may fill in with natural conifer regeneration, may be occupied by nonconifer regeneration, or may disappear as surrounding conifer crowns expand over them.

The BLM reforestation inventory system utilizes a "stocking survey" approach designed to assure

regeneration met distribution standards and to detect areas of nonstocked land within units. When such nonstocked areas are large enough to be operationally significant, they are scheduled for planting.

Concern was expressed in public comments about the effect of stocking irregularity on yield. A sample of 10 reforestation units in the Ashland Resource Area (the resource area that contains some of the harshest sites on the district) that arose from harvesting during the decade of the 1980s were randomly selected for evaluation of spatial diversity within young stands. After a number of trials with different approaches, a sampling method called "T-Square Sampling" was selected. This method of sampling develops a spatial pattern index called "C". "C" is under 1/2 for uniformly spaced trees, at or close to 1/2 when tree spacing is essentially random, and above 1/2 for stands where trees are clumped. Of the ten units examined, five had "Cs" somewhat above 1/2 and five had "Cs" somewhat below 1/2. The average "C" for the entire data set was 0.52, indicating that the average distribution of trees on the units is essentially random, not clumped.

The size of nonstocked openings on the units was also recorded. Average nonstocked opening sizes were about 1/80<sup>th</sup> of an acre with the exception of two units, one was understocked and one included significant permanently nonstocked areas of rock. With the exception of these two units, average opening sizes were small enough that they would close well before final harvest and would have little, if any, impact on thinning or final harvest yield.

It was concluded that, with the exception of understocked units and individual problem units, the distribution of trees in reforestation units is essentially random and that clumping or openings are not frequent enough or large enough to appreciably effect yields under existing silvicultural regimes. The spatial diversity prescriptions proposed for the PRMP would also be unlikely to have a measurable effect on yield.





# Appendix BB

## Effects of Silvicultural Practices and Silvicultural Systems on Wood Quality, Timber Yields and Economic Value<sup>1</sup>

This appendix describes the effects of intensive silvicultural practices on wood quality, timber yield and economic value, alone and sequenced together in silvicultural systems.

A variety of silvicultural practices are employed in the management of forest stands. The Bureau of Land Management (BLM) in western Oregon classifies precommercial thinning, commercial thinning, forest fertilization and pruning as intensive silvicultural practices. These practices are applied to forest stands to meet management objectives such as controlling species composition, controlling stand density and promoting growth and/or quality characteristics of selected trees. Intensive practices are usually scheduled in a sequence, for example, within a silvicultural system or prescription over the course of a planned rotation.

Wood quality is defined as the suitability of the material for a particular use and is determined from both the characteristics of trees (tree form, ring width, limbiness, and percent of juvenile wood) and from the physical properties of wood (specific gravity, fibril angle, and permeability). Log or tree size alone does not affect quality, but larger trees generally have more clear (knot free) wood and a smaller portion of the tree in juvenile wood.

Timber yield is defined as the total amount of merchantable wood produced over a rotation that is actually harvested. It is usually measured in cubic feet or board feet. Yields in this appendix are expressed in net cubic foot volumes or change in cubic volume.

Economic value is defined as the monetary worth of individual timber products or the net return on investment for individual practices or sequence of practices. The quantity and quality of timber harvested and the timing of costs and revenues affect economic value.

### Effects of Individual Silvicultural Practices

This section describes the effects of forest management actions on timber yields, wood quality and value in the case of pruning.

Uniformity and rate of growth affect the machinability and appearance of lumber. Rate of growth is a limiting factor in high-quality structural grades of lumber. Wood must have no less than four rings per inch to meet the criteria for select structural lumber. Specialty items such as scaffolds, joints, and beams must average more than six rings per inch. However, analysis of past problems with the strength of wood from managed stands has indicated that the problems were caused by the percent of juvenile wood, rather than growth rate. In Douglas-fir, juvenile wood occupies the first 15 to 25 rings. A higher proportion of juvenile wood could be expected for stands managed on short rotations. Effects on timber yield from individual silvicultural practices vary depending on the timing and intensity of treatment whether treatment is solitary or in combination with other practices.

### Thinning

Thinning is a silvicultural practice used to meet stand density, species composition and stand diversity objectives. Thinnings conducted prior to the time trees are considered to be of nominal merchantable size are called precommercial thinnings. Thinnings that remove merchantable products are designated commercial thinnings.

The principal effect of precommercial thinning is to permit earlier harvest through development of larger log sizes, increase the percent of stand volume on desired species, create stand densities and size distributions conducive to commercial thinning or other objectives. Precommercial thinning can permit greater realization of yield benefits from genetic improvement and forest fertilization by redirecting

growth potential to crop trees only. To be fully effective, precommercial thinning must be scheduled at the correct time in a stand's development (Reukema 1975). This is usually before growth retardation or stand differentiation occur.

Commercial thinnings are timber harvests scheduled any time after a stand reaches a combination of stem diameter and surplus volume which permit an economical harvest. Commercial thinning can be effective in increasing recoverable timber yields by harvesting trees which would otherwise die prior to the final regeneration harvest in stands as old as 150 years (Williamson and Price 1971) (Williamson 1982). Heavy commercial thinning shows the ability to accelerate the development of old-growth stand characteristics in current even-aged stands (Newton and Cole 1987).

For both types of thinning, the primary effect on wood quality are changes in the limb characteristics of trees. Thinning increases liminess and lengthens the time dead limbs adhere to the bole. Knots and the distorted wood around them reduce wood strength and the yield of wood graded for appearance (selects and shop grades). Thinning increases the proportion of younger stems which are in juvenile wood. These effects were described in Maguire et al. (1991). Low post-thinning densities can negatively affect timber yield by not maintaining enough trees to take advantage of full site growth capacity in the short term (Curtis and Marshall, 1986). Extremely low post-thinning densities can negatively affect wood quality through excessive taper and slope of wood grain and through production of wide growth rings.

## Fertilization

Fertilizer is applied to forest stands to offset limiting amounts of soil nutrients, particularly nitrogen. Fertilization treatments are usually scheduled with thinning treatments and are spaced 10 to 15 years apart.

Fertilization has the effect of accelerating stand development and increasing timber yields (Miller, Clendenen and Bruce 1988). Since fertilizer increases individual tree vigor and the rate tree crowns expand, it has been observed to reduce thinning shock, accelerate release and overcome damage from insects and drought. Fertilization tends to increase ring width and decrease wood specific gravity by an average of 5 percent (Megraw 1986). However, this is not thought to have a significant effect on wood quality. Fertilization increases piece size. Treatment can be timed to improve the ratio of mature wood to juvenile wood and after pruning to improve the production of a clear wood core.

## Pruning

Pruning is carried out to improve wood quality through the production of clear wood on rotations shorter than what would be required without the action. Pruning helps to avoid the production of wood with loose knots. Pruning is essential to insure the production of significant amounts of clear wood in intensively managed stands of Douglas-fir under normal even-aged management and short rotations (Cahill et al 1988) (Fight et al 1988). Pruning may also have benefits in meeting structural diversity objectives and decreasing fire hazard in areas with short natural fire return intervals. Pruning appears to be necessary to produce significant wood of acceptable quality from lower density stands (Briggs and Fight 1992).

Results of an analysis by the Medford BLM district on product value increase from pruning is shown in Figure 4-1 and Table 1.

A financial analysis of pruning of Douglas-fir and ponderosa pine was done by Fight, Bolon and Cahill 1993). Break-even cost of pruning pine is shown in Figure 4-2 using estimates of future wood prices and a 4 percent real interest rate for site index 55 and for site index 80, with and without commercial thinning.

Table 1. Effect of Pruning on Douglas-fir Wood Quality

Harvest Age	Percent Select Lumber		Value of Logs		Gain In NPV per tree
	Unpruned	Pruned	Unpruned	Pruned	
60	0%	35%	\$82	\$110	\$4.25
100	0%	51%	\$130	\$188	\$0.36

NPV = net present value using a 4 percent discount rate.

Pruning can decrease timber yields if a significant portion of the live tree crown is removed (O'Hara 1991). BLM does not propose levels of live crown removal that are likely to impact timber yields. BLM pruning operations are expected to have a neutral effect on timber yields.

## Effects of Silvicultural Systems.

This section summarizes the results of an analysis of timber yield and wood quality effects on economic return for selected silvicultural systems proposed for the PRMP. Silvicultural systems affect wood quality, timber yields and economic return by changing tree and stand growth patterns and the magnitude of discounted costs and benefits. The silvicultural systems analyzed are representative of management regimes proposed for the next decade on BLM lands classified as Northern General Forest Management Areas (NGFMA). This single analysis is intended to portray results which reflect average stand conditions and average response to treatments on a statewide basis for BLM managed lands in western Oregon. These silvicultural systems will vary somewhat within and between districts but, are representative enough to display relative effects of similar silvicultural systems.

Effects of the different management practices and combinations are depicted as percent change in timber yield, percent change in net present value (NPV), benefit cost ratios, and value per cunit (100 cubic feet) of timber yield.

## Silvicultural Systems Analyzed

Table 2 describes the various silvicultural systems analyzed. Analysis was limited to silvicultural systems incorporating precommercial thinning, commercial thinning, forest fertilization and pruning compared to a base prescription which represents an overstocked stand with no treatments until a final regeneration harvest.

## Analytical Assumptions:

Following are the specific assumptions made in the analysis.

- Difference in site productivity can significantly affect yields and financial returns (Koss and Scott

1978). BLM in western Oregon manages twelve planning units designated as Sustained Yield Units (SYU). Site quality is variable both within and between SYU's. Due to the complexity of trying to analyze each SYU separately, the Douglas SYU of the Roseburg District was selected as representative for BLM administered lands in western Oregon. Average productivity expressed as site index for this SYU is 100 using Hann-Scrivani site index curves (Hann and Scrivani, 1987). Site Index 100 is the approximate mid-point of average site indexes used by the westside BLM districts for decadal planning purposes in estimating timber yields.

- The costs for stand establishment treatments were derived from 1989 Roseburg BLM District contract cost data sources weighted by the percent of acres receiving the treatment. Logging and hauling costs were derived from tabular information compiled by the Medford BLM District for general westside BLM use in feasibility analysis for resource management planning.
- An inflation rate of zero (0) and no future real increase in wood value was assumed. A discount rate of 4 percent was used.
- The costs of establishing the current stand were not included in this analysis. However, the costs of establishing the next stand were included at the end of the assumed rotations. This convention is consistent with economic analyses done previously for BLM planning purposes in western Oregon<sup>2</sup>.
- Comparisons of effects were made at rotation (regeneration harvest) ages of 60 and 100 years depending on silvicultural system. 60 years represents probable average statewide minimum rotation ages for BLM. 100 years represents the probable average BLM rotation age if culmination of mean annual increment is used as the rotation age criteria. (Curtis 1992, Curtis and Marshall 1993).
- Intangible or intrinsic values (Smith 1987) such as the potential value of practices for meeting non-timber objectives were considered beyond the scope of the analysis.
- Pruning analysis was performed using the addition of select pricing for lumber grades and veneer market. Pruning of the first 17.5' (16' merchantable log) is assumed to occur at age 25.

Table 2. Summary of Silvicultural Prescriptions Analyzed

Silvicultural System	Description
Base	Overstocked (overdense) stand averaging 680 trees per acre at age of establishment. Final regeneration harvest at age 60 or 100.
PCT	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Final regeneration harvest at age 60 or 100.
PCT/FERT	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Fertilizer applied at ages 30 & 45. Final regeneration harvest at age 60 or 100.
PCT/CT <sup>1</sup>	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Commercial thinning at age 45. Final regeneration harvest at age 60.  Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Commercial thinning at ages 45 & 65. Final regeneration harvest at age 100.
PCT/FERT/CT <sup>1</sup>	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Fertilizer applied at ages 30 & 45. Commercial thinning at age 45. Final regeneration harvest at age 60.  Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Fertilizer applied at ages 30 & 45. Commercial thinning at ages 45 & 60. Final regeneration harvest at age 100.
PCT/Prune	Overstocked stand; precommercially thinned at age 12 to 250 trees per acre. Pruned 80 trees/acre at age 25. Final regeneration harvest at age 60 or 100.

<sup>1</sup> Silvicultural systems with two descriptive approaches are dependent on assumed rotation lengths. Variations in exact timing of practices will vary by district.

- All gross yield outputs from SWO-Organon were reduced for stocking irregularity, insects and disease, defect and breakage and effects of green-tree retention at a level of 7 large conifers per acre.
- Timber products harvested were assumed to be a mixture of lumber and veneer. Lumber prices used in TreeVal+ were derived by taking 1989 Table 9 figures shown in Warren (1993). TreeVal+ veneer prices were derived from reviewing Random Lengths publications (Nov. 1992 - Aug. 1993). The use of 1993 veneer pricing instead of associated 1989 values was required due to the lack of readily available data sources.

## Analytical Models

Future timber yields and wood quality tree characteristic outputs for managed stands were obtained from simulations using the System-1 young stand model, Version 1.8 (Ritchie et al, 1991) and the SWO-Organon growth and yield model Version 4.0 (Hann et al, 1992).

System-1 is an individual tree, distance-independent growth model. It is suitable for growing trees from a minimum of three years of age up to an age (15-20+ years) compatible with entry into growth models suitable for older stands such as SWO-Organon.

SWO-Organon is an individual tree, distance-independent growth and yield model. It was developed from sampling plots located in the mixed conifer zone of southwestern Oregon. The model was developed primarily to simulate the growth and timber yield of Douglas-fir and mixed conifer stands. The model was designed to allow projections of both even-aged and uneven-aged stand conditions under different silvicultural systems.

Wood value and economic analysis were analyzed using the TreeVal+ (Sachet et al, 1989), DF Prune (Fight et al, 1992), and Forestry Investment Program (FIP) (Ikaheimo 1990) models. The first two programs provide product recovery plus value data and partial cost data to the third model for an integrated economic analysis.

TreeVal+ is an analysis program which calculates tree or stand values based on predicted product recovery. TreeVal+ is appropriate for natural stands or managed plantations. Values of products harvested under the different regimes simulated were obtained from the TreeVal+ program.

DF Prune is a spreadsheet program designed to estimate the financial return from pruning coast Douglas-fir. Values of products harvested under regimes where pruning is simulated were obtained from the DF Prune program.

The Forestry Investment Program is a financial analysis program specifically developed for the economic evaluation analysis of silvicultural regimes. FIP utilizes data inputs from SWO-Organon, TreeVal,

DF Prune and other sources in calculations of net present values (NPV). The analysis can be structured to account for inflation, cost changes and product value changes over time.

## Results of Silvicultural Systems Analysis

Table 3 and 4 show the effects on timber yield and economic returns for the different silvicultural systems for rotation ages of 60 and 100 years after stand initiation. Wood quality change is not directly displayed but is expressed in the economic measures.

Percent change in cubic volume is the net timber yield increase above that of the base silvicultural system expressed as percent of net conifer cubic volume. Net present value (NPV) is calculated by subtracting discounted costs of producing timber from the discounted revenues from harvest. Percent change in NPV is the change in NPV relative to the NPV of the base silvicultural system. The benefit cost ratio depicts total discounted revenues divided by total discounted costs.

Value per cunit (100 cubic feet) is a simple relationship between total net revenues gained from a set of practices and the total net timber yield. The ratio allows interpretation of how each silvicultural practice functions to positively or negatively affect quantity (volume production) and/or quality (additions to value) of products produced.

**Table 3. Comparison of Yield Changes and Economic Returns for a 60-Year Rotation**

Silvicultural System	% Change in Cubic Volume	Net Present Value (NPV)	% Change in NPV	Benefit/Cost Ratio	Value per C Unit
Base	*	\$301	*	1.38	\$3.78
PCT	+7%	\$530	+76%	1.68	\$6.21
PCT/FERT	+13%	\$611	+103%	1.72	\$6.78
PCT/CT	+15%	\$497	+65%	1.49	\$5.43
PCT/FERT/CT	+21%	\$677	+125%	1.62	\$7.04
PCT/Prune	+7%	\$713	+137%	1.71	\$8.35

NOTES: \*-% change in cubic volume is the increase in volume above that produced by base prescription (overstocked stand condition).  
 -Net present value (NPV) is calculated by subtracting discounted costs from discounted benefits.  
 -% change NPV is the percentage of NPV increase or decrease compared to the NPV of the base prescription.  
 -Benefit cost ratio is calculated by dividing discounted benefits by discounted costs.  
 -Value per cubic foot = Total NPV divided by total yield of all harvests in cunits (100 cubic feet).



Table 4. Comparison of Yield Changes and Economic Returns for a 100-Year Rotation

Silvicultural System	% Change in Cubic Volume	Net Present Value (NPV)	% Change in NPV	Benefit/Cost Ratio	Value per C Unit
Base	*	\$470	*	3.04	\$3.47
PCT	+2%	\$526	+11%	2.74	\$3.80
PCT/FERT	+5%	\$532	+13%	2.57	\$3.75
PCT/CT	+17%	\$625	+32%	1.86	\$3.84
PCT/FERT/CT	+20%	\$716	+52%	1.88	\$4.39
PCT/PRUNE	+2%	\$539	+15%	2.37	\$3.90

NOTES: \*% change in cubic volume is the increase in volume above that produced by base prescription (overstocked stand condition).

-Net present value (NPV) is calculated by subtracting discounted costs from discounted benefits.

-% change NPV is the percentage of NPV increase or decrease compared to the NPV of the base prescription.

-Benefit cost ratio is calculated by dividing discounted benefits by discounted costs.

-Value per cubic foot = Total NPV divided by total yield of all harvests in units (100 cubic feet).

Table 5. Selected Tree Characteristics Which Affect Wood Quality

Silvicultural System	60-Years		100-Years	
	Average DBH	Rings per Inch	Average DBH	Rings per Inch
Base	11"	11	16"	13
PCT	15"	8	20"	10
PCT/FERT	16"	8	21"	10
PCT/CT	17"	7	23"	9
PCT/FERT/CT	18"	7	24"	8
PCT/PRUNE	15"	8	20"	10

Table 5 shows a comparison of two qualities influencing wood quality; average diameter at final harvest and average rings per inch.

All silvicultural systems showed an increase in timber yield above the base at both rotation ages analyzed. Gains were similar at both ages for silvicultural systems which included commercial thinning. The commercial thinnings harvest trees which would otherwise die before final harvest and would not be recoverable as usable products (Smith 1962, Reukema and Bruce 1977). Those silvicultural systems that did not include commercial thinning did

not recover this mortality and therefore showed a decline in percent yield increase at 100 years.

All silvicultural systems showed a positive economic return at both rotation ages simulated. All tested combinations of practices produced higher levels of economic return than the base level alone. Economic returns are greater for all systems for the 60 year rotations.

<sup>1</sup> More details of the unpublished analyses described in this appendix are available from the Medford and Roseburg BLM districts.

<sup>2</sup> Economic Efficiency of Intensive Management Practices for the Douglas SYU, 1991; unpublished report on file at Roseburg BLM.

# Appendix CC

## Condition of Stream Habitat on All Planning Area Lands in the Short Term and Long Term Under All Alternatives, Except the NA

Stream Order	Stream Mile	Habitat Quality Miles								
		Existing			Short term			Long Term		
		Minimal	Fair	Good/Opt.	Minimal	Fair	Good/Opt.	Minimal	Fair	Good/Opt.
3	1,004	279	381	344	222	360	422	44	151	809
4	400	126	151	123	100	146	154	21	101	278
5	167	48	63	56	39	60	68	16	33	118
6	53	13	21	19	10	20	23	3	13	37
7	29	14	8	7	14	8	7	14	8	7
8	8	0	5	3	0	5	3	0	5	3
9	40	0	40	0	0	0	4	0	0	40
Total	1,701	480	629	592	385	599	717	98	311	1,292

<sup>1</sup>Two hundred years was selected for the long-term period because optimum loading of large woody debris in streams and maximum sustainable fish production in old growth forests would be achieved during that period of time assuming other factors such as ocean survival, catastrophic events, and impacts originating from other ownerships do not adversely affect stream conditions and populations.





# Appendix DD

## Present Condition of Potential Special Areas

Special Area	Condition
<b>ACEC</b>	
Bill Creek	This area is bordered on the north and west by private land. No roads are present within the proposed ACEC. A road exists on the ridge above the headwaters of the creek. The Port-Orford cedar in the area is not infected with root rot disease. This area has not been logged.
Bobby Creek	Contains one of the largest contiguous nonentered stands of mixed conifer and evergreen hardwoods in southwestern Oregon. Riparian zones are influenced only by natural processes. There is a road near the bottom, and a road along the ridge, and a foot trail exists for access to stream gaging equipment. Portions of this area also qualify for RNA designation.
Cedars of Beaver Creek	This is an island of undisturbed old growth forest surrounded by logged area. There is an unimproved jeep road crossing from the southwest to the northeast corner ending in a 1/2-acre opening. A power line crosses one corner of the area.
Crooks Creek	A road approaches the west boundary but no roads exist within the proposed area. A historic CCC trail is present. This trail is in good condition within the BLM boundary but is degraded throughout the surrounding private lands. The small area in T. 38 S., R. 6 W., section 6 has been logged.
Dakubetedee	Contains logged areas with some roads, landings, and salvaged areas. The Sterling Mine Ditch trail crosses part of the area.
Enchanted Forest	Has a full bench horse trail passing through the old growth forest. Remnants of mining activity and spring development are visible.
Flounce Rocks	Contains a road and one communication site. There is less than an acre of an old clearcut within the boundary. A trail to Baker Cypress Grove exists. The area contains a buried power line. Since the nomination, a two-acre fire was suppressed in the area. Twenty acres of old growth remain in natural condition.
French Flat	Has had severe impacts from past mining activities. Evidence includes: several ditches, mining pits, tailing piles, dams, and roads. Frequent OHV use has caused some damage to the hydrology, soil profiles, and plant composition.
Hole-in-the-Rock	One steep unmaintained trail exists. There is no road access or OHV use. The area is in a natural condition except for a remnant campsite.

Special Area	Condition
Hoxie Creek	Undisturbed old growth is surrounded by reforestation failures. The forest receives minimal recreation use and has no visible hiking trails.
Iron Creek	There are no roads within the proposed ACEC. This is one of few unentered stands in the area.
Jenny Creek	Grazing, roading, logging, and water diversion have occurred. Due to some of these, streambank erosion and siltation have occurred. A massive land slide near Fredenberg Spring contributed to siltation of the stream.
Little Hyatt	A potential recreation site exists adjacent to the proposed ACEC. The Pacific Crest Trail passes through the undisturbed old growth of the area.
Moon Prairie	Undisturbed old growth forest island. Surrounded on all sides by extensive logging.
Pacific Crest Trail	The visual quality for most BLM land has been unimpaired and remains in a natural condition.
Pilot Rock	A road dissects the area. The Pacific Crest Trail crosses the northern part. Some OHV use exists. Reclamation on the portion of the OHV road to the base of the rock has begun. This includes a berm and planted natural vegetation.
Poverty Flat	A diverse assemblage of natural communities in good condition with few impacts from grazing. Some OHV use occurs along the north side of the area. Encroachment from the gravel storage area is occurring.
Rock Creek	An undisturbed area of old growth timber which has no roads or disturbances within the boundary.
Rogue River	The wild section of the Rogue flows through a natural environment which includes a hiking trail. The recreation section is paralleled by a paved road, campsites, boat ramps, and homes. On the north bank within this area there are stretches of natural, undisturbed plant communities.
Rough & Ready	The area contains several OHV roads. Power lines and a ditch traverse parts of the proposed area. Historic hydraulic mining has occurred along the creek. Mining claims in this area are under patent application.
Siskiyou Mountain	Many activities have altered the natural condition. These include the introduction of weedy annual species such as cheat grass, meadowsahead, and tarweed in heavily grazed areas. Roads occur several places within the area and OHV use is evident in some areas. A major power line crosses the area. A major hiking trail cuts across the northwest corner.
Sterling Mine Ditch	The integrity of the area is good. Most of the Sterling Mine ditch is intact. Vegetation is in natural condition in most of the area. Timber harvesting has occurred near the west end. Some invasive weeds occur.
Tin Cup	One of the last remnants of an undisturbed true fir forest. There is an unimproved road and an old hunter's camp near the edge of this area.

Special Area	Condition
Williams Watershed	This area is large and encompasses several watersheds. Roads are present within the boundaries of the area. Logging has occurred in many of the sections. Some mining disturbance is present within the boundaries.
<b>ACEC/RNA</b>	
Lost Lake	There has been moderate grazing in the area but intensity has not been extreme due to the topography. A clearcut exists on private land at the southwest edge. Two trails lead to the lake where several fire rings still exist.
North Fork Silver Creek	Adjacent to an intensively logged and roaded area. Most of the nominated area is an island of intact forest, however, two small units which have been harvested are along the ridge.
Grayback Glades	Undisturbed area except for an old trail through the middle of the area. This trail is in disrepair and is not used. Roads approach the area to the north and east but are not included within the proposed RNA.
Round Top Butte	The current condition of native grassland on Round Top Butte is very good. Little disturbance has taken place. Grazing impacts are at a minimum. A road exists in the area.
Holten Creek	The integrity of the Holten Creek area is very good. There is little evidence of unnatural disturbance. There are no roads or trails in the area and those adjacent do not threaten the area's integrity. Stands show evidence of being burned at least 3 times in the last 250 years. One major tributary has what appears to be calcarious materials which has caused unusual land forms in the stream channel.
Oregon Gulch	The site borders private land that has had significant logging in the recent past. The meadows within the RNA have good stands of native bunch grass and the oak/pine savannah has a native bunch grass understory. There is a heliport near the top of Rosebud Mountain. Except for logging activities adjacent to one edge and the heliport, the area is in good condition.
Old Baldy	Some limited logging has occurred along the Pacific Crest Trail that crosses the Old Baldy proposed RNA. Cat tracks are evident across the trail.
Pipe Fork	This area has stands of Port-Orford cedar that are not infected by root rot. There are no roads in the area. The area has fragile, granitic soils. No logging has occurred in the area.
Scotch Creek	This chaparral area is dominated by two distinct communities: the roseaceous community on the north facing slope and the southwest corner of the proposed RNA and a ceanothus/arctostaphylos community with scattered pockets of trees throughout the remaining area. There are no roads or trails within the area.
Brewer Spruce RNA Enlargement	The proposed enlargement area has no evidence of recent fires. It is unroaded and unentered. An old scenic trail to Kerby Peak exists within the proposed enlargement. The proposed area includes better examples of Brewer Spruce than the currently designated area.

BLM LIBRARY  
RS 150A BLDG. 50  
DENVER FEDERAL CENTER  
P.O. BOX 25047  
DENVER, CO 80225

R'S CARD

4 1994 v. 2

Land  
Medford

it proposed  
management plan

OFFICE	DATE RETURNED

(Continued on reverse)

QH 76.5 .07 M434 1994 v. 2  
U. S. Bureau of Land  
Management. Medford  
Medford District proposed  
resource management plan

BLM LIBRARY  
RS 150A BLDG. 50  
DENVER FEDERAL CENTER  
P.O. BOX 25047  
DENVER, CO 80225

